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BRITISH STEM- AND LEAF-FUNGI (COELOMYCETES)

A Contribution to Our Knowledge of the Fungi Imperfecti Belonging to the Sphaeropsidales and the Melanconiales

BY

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VOLUME II

SPHAEROPSIDALES

COMPRISING SPHAERIOIDEAE, WITH COLOURED SPORES; NECTRIOIDEAE, EXCIPULACEAE, AND LEPTOSTROMATACEAE;

AND

MELANCONIALES

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VOLUME II

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COELOMYCETES

SPHAEROPSIDALES

SPHAERIOIDEAE

Section B, with coloured spores

(For Section A see Vol. I, p. xviii)

Spores more or less strongly coloured.

a. Spores short or with not more than one septum.

1. Spores continuous . . . . PHAEOSPORAE
2. Spores uniseptate. . . . . PHAEODIDYMAE

b. Spores elongated; two or more septa.

1. Spores transversely septate only . . PHAEOPHRAGMIAE
2. Spores muriform . . . . DICTYOSPORAE

PHAEOSPORAE

Spores more or less dark-coloured, continuous.

I. Pycnidia single or in groups, but without stroma.

A. Pycnidia glabrous.

1. Pycnidia not beaked.

a. Pycnidia covered, then erumpent.

† Pycnidia not very thick-walled, rather soft; spores small, sporophores very short . . . *Coniothyrium*

†† Pycnidia thick-walled, hard; spores large, sporophores conspicuous . . . . *Sphaeropsis*

b. Pycnidia superficial, carbonaceous . [*Aposphaeriopsis*]

2. Pycnidia beaked . . . . *Naemosphaera*

B. Pycnidia beset with external hairs . . . [*Chaetomella*]

II. Pycnidia tending to be grouped upon a stroma.

A. Spores small, Coniothyrium-like . . . . . . *Cytoplea*

B. Spores usually large, Sphaeropsis-like. . . *Haplosporella*

A REMINDER. After the name adopted for each species (printed in clarendon), the next binomial, if composed of the same specific, but a different generic appellation, is the name conferred upon that species by the original discoverer or describer.

CONIOTHYRIUM Corda, Icon. iv. 38.

Pycnidia subepidermal, then erumpent or nearly superficial (immersed in wood at the base only), subglobose or depressed, papillate, usually rather thin and membranaceous, rarely subcarbonaceous, black; texture of small-celled parenchyma, sometimes darker round the ostiole. Spores small, roundish or ellipsoid, continuous, hyaline or pale at first, later olivaceous or ± smoky-brown, most often uniguttulate, but sometimes biguttulate; sporophores short and simple, usually inconspicuous.

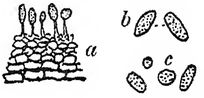

Fig. 32. *Coniothyrium*: *a*, section of wall of pycnidium of *C. Psammae*, with spores, × 400. Spores of *b*, *C. olivaceum*; *c*, *C. Fuckelii*; × 600.

This genus has been often compared with Sphaeropsis, but it is very different and always has much smaller spores. There is also nearly always a difference in the nature of the pycnidial wall, and the sporophores of Coniothyrium are often little more than the conical innermost cells of the peridium.

A Coniothyrium, when young, can easily be mistaken for a Phoma, the colour of the spores in some species being then hardly perceptible, except in a mass. But a search for older pycnidia soon reveals the truth. Tassi's genus *Phyllostictella* was formed to include those species which are found on leaves; but the same species can occur on both stems and leaves, and Phyllostictella, if used at all, should be confined to those which make distinct Phyllosticta-like spots, e.g. *C. concentricum*, *C. Diplodiella*, and *C. Hellebori*.

There is evidence that some fungi reputed to belong to Coniothyrium are merely young states of species which when mature have septate spores. For instance, it is certain that *Coniothyrium Obiones* Jaap is only an early state of *Ascochytula Obiones* Died. and that *C. olivaceum* var. *Ononidis* All. is an early state of *Microdiplodia ononidicola* Rhodes (p. 29). It might be suggested that some, at least, of the specimens called *C. Ribis* Brun. are the same state of *Ascochytula Grossulariae* Died., just as many species now known to belong to Ascochyta or Diplodina were called Phoma by the earlier mycologists: e.g. *Ascochyta Lycopersici* Brun.

The following species are arranged (as usual in large genera) in the

alphabetic order of the hosts, Dicotyledons[1] first with plurivorous species at their head, followed by Monocotyledons, Cryptogams, and other substrata.

Plurivorous

Coniothyrium conoideum Sacc. in Mich. i. 203; Syll. iii. 316. Trail, in Scot. Nat. 1886, p. 266. All. vii. 26.

Pycnidia scattered, between hemispherical and conical, at first concealed by the epidermis, then erumpent and ± superficial, black, somewhat shining, about 180 μ diam. Spores globose to ellipsoid, yellowish-olive, uniguttulate, $3 \cdot 5 \times 2 \cdot 5 \mu$ (ellipsoid to sausage-shaped, $5–7 \times 2 \cdot 5–3 \mu$, Trail).

On dead stems of *Angelica silvestris*, Aberdeen (Trail). On dead stems of *Urtica dioica*, Bromsgrove, Ws. May, Dec.

Also recorded abroad on *Campanula* and *Scrophularia*. Trail found the spores, in company with the asci and ascospores, in perithecia of *Leptosphaeria conoidea* de Not. = *L. Doliolum* var.; I have seen the same on *Urtica*.

Fr. Holl. Ital.

Coniothyrium Fuckelii Sacc. Fung. Ven. v. 200, in Mich. i. 207; Syll. iii. 306. All. vii. 25. Died. 576. Mig. 253. T.B.M.S. iii. 222. Journ. Roy. Hort. Soc. xxxiv. 222, f. 34. Massee, Dis. Cult. Pl. p. 415, f. 129. Duggar, Fung. Dis. Pl. p. 354, f. 173–4. *C. Rosarum* Cooke & Harkn. in Grevill. xii. 92.

Pycnidia scattered or in clusters, subepidermal, then erumpent, globose-depressed, black, 150–250 μ diam.; texture thin, translucent, pale-brown, darker round the short, sometimes impressed, ostiole. Spores very abundant, globose to shortly ellipsoid, olivaceous or pale dusky-brown, 3–4 μ diam. or $2 \cdot 5–6 \times 2–4 \mu$, often with a large central guttule; sporophores not evident. (Fig. 32*c*.)

On dead stems of *Aloysia citriodora*, Polperro (Rilstone). On dead stems of *Tecoma radicans*, Kew Gardens (Cooke). On twigs of *Salix*, Aberdeen (Trail) along with its ascophorous stage, *Leptosphaeria Coniothyrium*. On stems of *Rosa*, causing canker, common in south and mid England. On twigs of *Rubus idaeus*, Clyde (Trail). On dead *Rubus fruticosus*,

[1] As in the previous volume, the tree Gymnosperms, *Pinus*, *Picea*, etc., regarded merely as hosts, are here included with the Dicotyledons. This is not a serious criticism of the Botany of to-day, but a following of the example of the illustrious Saccardo.

especially on the prickles, Harborne, near Birmingham (the typical form, not f. *Rubi* Sacc.). Recorded frequently on *Ribes Grossularia*, Middlesex; Sussex; Ireland; etc.; but see *Conioth. ribicolum*. *Conioth. Laburni* Sacc. Syll. xiii. 386 seems also to belong here.

The pycnidia may be very thin and pale when young, and occasionally subgelatinous; the spores are often very numerous, and even smaller than $2 \cdot 5 \times 2\,\mu$, showing no colour except in mass. I have found it on Apple twigs and on Gorse, and it is frequently met with on imported Rose stems (on the dead wood). It is mostly saprophytic, but readily becomes a wound-parasite or attacks any tender spot, and causes a serious disease which can spread to other hosts. Recorded abroad also on *Ampelopsis*, *Berberis*, *Citrus*, *Helianthemum*, *Robinia*, etc., but no doubt often incorrectly. Its chief distinction seems to lie in its small and pale spores, but the only real test is its genetic connexion with *Leptosphaeria Coniothyrium* Sacc. It is easily mistaken when young for a Phoma.

Europe, U.S.A., Canada, Australia.

Coniothyrium olivaceum Bon. *apud* Fckl. Symb. Myc. 377. Sacc. in Mich. i. 205; Syll. iii. 305. All. vii. 26. Died. 565. Mig. 252.

Pycnidia scattered or gregarious, at first covered by the epidermis, then erumpent and at length nearly free, subglobose, blackish, 200–300μ diam., with a papillate ostiole; texture parenchymatous, translucent, olivaceous, darker round the pore. Spores oval or oblong-ellipsoid, often eguttulate, at first pale or even colourless, then brownish-olive, $4–8 \times 2–5\mu$. (Fig. 32*b*.)

On twigs of very many different plants, less often on leaves and then smaller and less developed; occasionally on wood. Common, as a collective species. Spring and summer.

Distinguished from *C. Fuckelii* by the larger and more prominent pycnidia, and the larger, less globular, and finally darker spores. Allescher and others give a list of over twenty plants as hosts, and descriptions of some of the varieties found on them.

Var. **Atropae** Grove.

Spores oval, at first quite colourless, $5–6 \times 2 \cdot 5\mu$. On dead stems of *Atropa Belladona*, Hereford.

Var. **Ononidis** All. in Ber. Bayer. Bot. Gesell. v. 18; Krypt. Flor. vii. 43. Mig. 253. Sacc. Syll. xiv. 923.

Pycnidia scattered, covered by the epidermis, erumpent,

papillate, globose, 100–150μ diam. Spores oblong or ellipsoid-oblong, eguttulate, faintly olivaceous, 5–7 × 2–3μ.

On dead stems of *Ononis arvensis*, Hannaford, Looe (Rhodes). But see *Microdiplodia ononidicola*, *infra*, p. 29, of which this is the early state.

Among other hosts mentioned by authors are: *Ailanthus*, *Amorpha*, *Arauja*, *Calycanthus*, *Carpinus*, *Catalpa*, *Celtis*, *Cycas*, *Eucalyptus*, *Euonymus*, *Hedera*, *Hesperis*, *Laurus*, *Lavandula*, *Lonicera*, *Lycium*, *Magnolia*, *Philadelphus*, *Populus*, *Rhus*, *Sambucus*, *Sarothamnus*, *Sophora* and *Wistaria*.

Europe, N. America.

Coniothyrium vagabundum Sacc. Syll. iii. 310. All. vii. 33.

"Pycnidia immersed, sphaeroid or subangular; contents black. Spores oblong, olivaceous, 4 × 1·5μ."

The type, on branches of *Cornus sanguinea*, has not yet been found in Britain. But a var. on branches of *Ribes* has occurred in Worcestershire (Rea) and in Dumfriesshire (Boyd).

The pycnidial stage of *Leptosphaeria vagabunda* Sacc. which was found in association with it on *Ribes* by Boyd. See under *C. ribicolum* Brun. Varieties have been recorded abroad also on *Berberis*, etc.

Holl. Denm. Ital.

Aucuba

Coniothyrium Aucubae Sacc. Syll. iii. 310. All. vii. 29.

Pycnidia gregarious, subepidermal, nearly globose, scarcely papillate; contents black. Spores ovoid, of a sooty-brown colour, 6 × 4–4·5μ.

On dead branches of *Aucuba japonica*. Kew Gardens. *n.v.* On leaves of the same, Ayrshire (Boyd).

Considered by Saccardo to be the pycnidial stage of *Physalospora pustulata* Sacc.

Ital.

Buddleia

Coniothyrium Buddleiae, comb. nov. *Phoma Buddleiae* Cooke, in Grevill. xvi. 48. Sacc. Syll. x. 148.

Pycnidia scattered, up to 200μ diam., covered by the epidermis, which is slightly elevated and at length pierced by the ostiole. Spores oval or ovoid, mostly uniguttulate, pale-olive in mass, 5–6 × 2·5–3μ (6 × 4μ, Cooke; 5–7 × 4–5μ, Boyd).

On dead twigs of *Buddleia globosa*, Kew Gardens (Cooke); Ayrshire (Boyd). On twigs of *B. albiflora*, Edgbaston Botanic Gardens. On *B. variabilis*, Polperro. Apr.–Jul.

The pycnidium is that of a Phoma, but the spores of Cooke's specimens are coloured as described above; those of Boyd's specimens are darker and broader, and with their single central guttule are those of a typical Coniothyrium. *Phoma Buddleiae* Brun. Champ. Nouv. vi. 2 (see Sacc. Syll. *l.c.*) may be a young state.

Cassia

Coniothyrium cassiicola Cooke, in Grevill. xiii. 96. Sacc. Syll. x. 264. All. vii. 31.

Pycnidia scattered or gregarious, globose, brown, covered by the thin epidermis, prominent, at length often free, 250–500 μ diam. Spores ellipsoid, pale pellucid-brown, often with one guttule, 5–6 × 3–4 μ.

On stems of *Cassia marylandica*. Kew Gardens. Apr.

Chenopodiaceae

Coniothyrium Obiones Jaap, in Schrift. Naturw. Ver. Schles.-Holst. xiv. 29. Died. 572. Mig. 255. Sacc. Syll. xxii. 974.

Pycnidia gregarious, punctiform, depressed-globose, black, shining, 150–200 μ diam., at first covered, then erumpent by a short papilla, which is pierced by a pore; texture rather thin, obscurely parenchymatous. Spores ovoid, globose, or ellipsoid, pale-olivaceous, eguttulate or with a central guttule, 5–8 × 3·5–5 μ; sporophores short, subconical. (Fig. 33 *c*, p. 14.)

On dry stems of *Obione portulacoides*: Chesil Beach, Dorset; Sandplace, Cornwall (Rhodes). On stems of *Atriplex Halimus*: Polperro (Rilstone & Rhodes); near Lamorna Cove, Penzance. May–Jul.

An early state of *Ascochytula Obiones* Died. (*q.v.*).
Germ.

Fuchsia

Coniothyrium Boydeanum A. L. Smith, in Journ. Roy. Micr. Soc. 1900, p. 423, pl. 3, f. 3, and T.B.M.S. 1901, i. 155. Sacc. Syll. xvi. 910. All. vii. 920.

Pycnidia scattered or gregarious, arising in the inner cortex and perforating the epidermis, somewhat lens-shaped, 300 × 200 μ, surrounded by a few loose hyphae; texture parenchymatous, yellowish-brown. Spores globose to ovoid, hyaline,

then dark smoky-brown, smooth, granulose within, usually about 12μ diam., but at times reaching 15 × 10μ.

On inner bark of dead branches of *Fuchsia*. Seamill, Ayrshire (Boyd). *n.v.* Oct.

Hedera

Coniothyrium Hederae Sacc. in Mich. i. 204; Syll. iii. 307? *C. olivaceum* var. *Hederae* Sacc. *ibid.* 306.

This is recorded on the leaves of *Hedera Helix*, Trench Woods, Ws. (in the Trans. Worc. Nat. Club, viii. 116), with spores 5–6 × 2·5μ. I have not seen these specimens, but all the others which I have seen under this name are *Melanconium Hederae* Preuss. In fact I believe that, apart from var. *Hederae* Sacc. of *Coniothyrium olivaceum*, there is scarcely ever found a fungus of that genus on *Hedera*. The species described by Diedicke (pp. 569–70), with its long filiform sporophores, cannot be a Coniothyrium, and Allescher's on p. 39, with figure on p. 4, is certainly a Melanconium.

Helleborus

Coniothyrium Hellebori C. & M. in Grevill xv. 108. Sacc. Syll. x. 261. All. vii. 39. Died. 570. Mig. 254. Massee, Dis. Cult. Pl. 415. *C. olympicum* All. in Hedwig. 1897, p. (162). *C. Delacroixii* Sacc. x. 261. *Septoria Hellebori* Thüm. Fung. Austr. no. 898. *Phyllostictella Hellebori* Tassi, in Bull. Lab. Ort. Bot. Siena, 1901, iv. 5. *Phyllosticta atrozonata* Voss, Mat. Pilzfl. Krains, v. 230, f. 4. Irish Nat. 1909, p. 97. Sacc. Syll. x. 125. All. vi. 124.

Spots amphigenous, roundish, sooty-brown, paler in the centre, blackish towards the margin, 1–3 cm. across, mostly marginal, concentrically zoned with lighter and darker belts. Pycnidia usually epiphyllous, collected chiefly in the centre of the spot, small, globose to pyriform, blackish, for some time covered by the epidermis, then emergent by the vertex; texture thin. Spores oval, pale olive-brown, 4–5 × 2–3μ.

On fading leaves of cultivated *Helleborus niger*. Not uncommon; England, Scotland, Ireland. Jan.–Sept.

The blotches, which have a scorched appearance and are a serious disfigurement, may be found, though less often, on *H. viridis*.

S. and Mid. Europe.

Ilex

Coniothyrium Ilicis Sm. & Ramsb. in T.B.M.S. 1917, v. 426.

Spots bleached, whitish. Pycnidia epiphyllous, congregated, fuscous, then black, immersed, somewhat prominent, papillate, about 150–200μ diam. Spores globose to ellipsoid, pale-brown, eguttulate, 3–5 × 2–3μ.

On fading leaves of *Ilex Aquifolium*. St Anne's-on-Sea, Lancashire (Sm. & R.), July. Also causing an epidemic on all the Holly trees in a plantation, Sutton Coldfield Park, March, 1922.

Kerria

Coniothyrium Kerriae Le Bret. in Rev. Mycol. 1891, p. 169. T.B.M.S. i. 115. Sacc. Syll. x. 264. All. vii. 42.

Pycnidia (not described). Spores almost spherical, brown, $4–6 \times 4{\cdot}5\mu$.

On dead branches of *Kerria japonica*. Seamill, Ayrshire (Boyd). *n.v.* Nov.

The French specimens were accompanied by *Phoma* (*Phomopsis*) *japonica* Sacc. and *Diplodia Kerriae* Berk.

Fr.

Peplis

Coniothyrium Peplis Sm. & Ramsb. in T.B.M.S. 1914, iv. 326.

Spots none. Pycnidia crowded, punctiform, globose-depressed, at first concealed by the epidermis, then exposed and dingy-grey, $170–220\mu$ diam., pierced by a very minute ostiole. Spores very numerous, subglobose-ellipsoid, apiculate, biguttulate, at first hyaline, then fuscous, $7–8 \times 5–6\mu$, black when seen in mass.

On living stems and leaves of *Peplis Portula*. Ardeen Sands, Stevenston, Ayrshire (Boyd). Sept.

Picea

Coniothyrium glomerulatum Sacc. in Mich. i. 209; Syll. iii. 314. All. vii. 23.

Pycnidia aggregated (2–5 together), immersed, then erumpent, subglobose, black, about 150μ diam.; peridium of minute cells, very thick and dark. Spores copious, oval, $3–4 \times 1{\cdot}5–2\mu$, olivaceous-brown; sporophores not seen.

On cone-scales of *Picea excelsa*. Hereford. May.

Fr.

Quercus

Coniothyrium quercinum Sacc. Syll. iii. 312. All. vii. 50. Died. 574. Mig. 256. *Clinterium quercinum* Bonord. Abhand. Myk. ii. 145.

Var. **glandicola**, var. nov. *ad glandes Quercus*.

Pycnidia densely gregarious, subglobose, then depressed, covered by the epidermis, then half-erumpent and surrounded

by the thin edge of the burst epidermis, very black, 160–180μ diam.; peridium of minute dark cells, at length pierced by a small round pore. Spores copious, subglobose to oblong-oval, very pale olivaceous, 4–6 × 2·5–3μ; no sporophores seen.

On acorns of *Quercus Ilex*, Hadzor Hall, Ws. (Grove & Rhodes). Mar.

The type of the species was found in Germany on branches of *Quercus*, but the size of the spores is not given.

Ribes

Coniothyrium ribicolum Brun. in Act. Soc. Linn. Bord. 1898, p. 14. Sacc. Syll. xiv. 923. All. vii. 52. Sm. & Rea, in T.B.M.S. 1907, ii. 168; 1908, iii. 43, pl. 1, f. 8.

Pycnidia subepidermal, then erumpent or even superficial, subglobose or varying towards conical, black. Spores subglobose to oblong-ovoid, sooty olive-brown, rarely with one or two guttules, about 3–4 × 1·5–2μ.

On twigs of *Ribes Grossularia*. Worcestershire. June.

"The pycnidia were broader than deep, about 140 × 80μ; spores ellipsoid, 4–6 × 2μ." In the later communication (1908) Smith & Rea came to the conclusion that *C. ribicolum* Brun. is a form of *C. vagabundum* Sacc. (*q.v.* p. 4).

Fr.

Coniothyrium Ribis Brun. Champ. Saint. 338. Sacc. Syll. x. 263. All. vii. 51. T.B.M.S. v. 161. Died. 574. Mig. 257.

Pycnidia ± gregarious, erumpent, globose, brownish-black, 150–200μ diam. Spores oblong-ellipsoid, brown, eguttulate, 8–10 × 3–3·5μ.

On dead branches of *Ribes Grossularia*. Crediton.

It is probably an early state of *Ascochytula Grossulariae* Died. Cf. Lambotte, in Flor. Myc. Belg. suppl. 2, p. 65.

Fr. Belg. Germ. Denm. Swed.

Coniothyrium melanconieum Sacc. in Ann. Mycol. vii. 436. Died. 575. Mig. 257 and 463.

Pycnidia gregarious or scattered, immersed, lens-shaped, 180–200μ diam., opening by a pore (which afterwards becomes torn). Spores ovate-oblong, rounded above, multi-microguttulate (?), fuliginous-olive, 6–8 × 4μ; sporophores unseen.

On dry branches of *Ribes Grossularia*, Kew Gardens. On cuttings of the same, in a garden near Ockeridge Woods, Worcs. (Rhodes & Grove). Apr.

Cf. *C. Ribis* Brun. The Ockeridge specimens were accompanied on the same twigs by Diedicke's *Phomopsis ribesia* and *Ascochytula Grossulariae*.
Germ.

Rubus

Coniothyrium tumefaciens Güss. Journ. Roy. Hort. Soc. 1908, xxxiv. 230, f. 35, 36. Massee, Dis. Cult. Pl. 417.

Pycnidia scattered, free, conical or globose, blackish-brown, 300–345 μ diam., opening by a round pore. Spores ovoid, eseptate, pale dingy-green, $5–7 \times 3–4\,\mu$; sporophores long, septate, unbranched or slightly so at the summit, 29–38 μ long.

On shoots of *Rubus fruticosus*. Kent.

Causing large warty excrescences or irregular nodules, varying in size from that of a pea to that of a walnut. *n.v.* A very doubtful species of Coniothyrium.

Sarothamnus

Coniothyrium Sarothamni Sacc. Syll. iii. 308. All. vii. 55. Died. 577. Mig. 257. *Phoma Sarothamni* Thüm. Myc. Univ. no. 576. *C. leguminum* Sacc. Syll. xi. 514. Died. p. 577, p. 552, f. 14.

Pycnidia gregarious, globose, covered by the epidermis, then erumpent and free, flattened, black. Spores $\pm$ oval, often eguttulate, pellucid, pale-fuscous, $5–7 \times 3–3{\cdot}5\,\mu$; no sporophores seen.

On thin dead twigs of *Sarothamnus scoparius*: Cheshire (Ellis); near Aberdeen (Trail); Ayrshire (Boyd). On petals and sepals of the same, Ayrshire. On dead legumes of the same, with smaller pycnidia, Ayrshire (Boyd). On twigs of *Colutea arborescens*, Kew Gardens. Nov. Dec.

The spores are at first very pale olive, $4–4{\cdot}5 \times 2–2{\cdot}5\,\mu$, soon becoming darker; texture of pycnidia (on the legumes) parenchymatous, dark-olivaceous, but translucent (especially when empty).
Denm. Germ. Austr.

Tamarix

Coniothyrium Tamaricis Oud. Contr. Fl. Myc. Pays-Bas, xvii. 257. Sacc. Syll. xvi. 909. All. vii. 921. Died. 577. Mig. 258. *C. Tamarisci* Henn. in Kab. & Bub. Fung. Imp. exs. 458. Mig. 258. See Ann. Mycol. viii. 62. ? *Phoma Tamarisci* (Mont.) Sacc. Syll. iii.

94. (*q.v.* in Vol. I, p. 109.) *Sclerothyrium Tamarisci* v. Höhn. in Hedwig. 1918, lx. 181.

Pycnidia scattered or gregarious, subprominent, globose-lenticular, thin-walled, black, 90–125μ diam., with a round pore. Spores ovate or ellipsoid, at first hyaline, then pale-olivaceous, mostly uniguttulate, 5–8 × 3·5–4·5μ; sporophores not seen.

On twigs of old *Tamarix*. Kew Gardens (Cooke). Near Barmouth (Rhodes & Grove). Polperro (Rilstone & Rhodes). Norfolk (E. A. Ellis). Jul. Aug.

I have found this on *Tamarix* (at Barmouth) on the thin twigs, while *Cytospora Tamaricis* Brun. occurred on the thicker branches of the same bush; it was the same in the Norfolk specimens. A clustered form of this species is *Haplosporella caespitulosa* Died. (*q.v. infra*, p. 21).

Germ. Canada.

Ulex

Coniothyrium sphaerospermum Fckl. Symb. Myc. 377. Sacc. Syll. iii. 308. All. vii. 34. Mig. 253. Ellis, in T.B.M.S. iv. 293.

Pycnidia scattered, punctiform, erumpent on a dried portion of the host, globose, papillate, black. Spores numerous, subglobose, yellow, about 2–3μ diam.

On spines, etc., of *Ulex europaeus*, New Forest (Cooke). On dead spines of *Ulex*, and pods of *Laburnum*, Cheshire (Ellis). On the spines, Ayrshire (Boyd); Sling Common, Worcs. Jun.–Nov.

Recorded abroad also on *Cytisus sagittalis*, *Genista*, and ? *Coronilla*. It would seem more sensible to regard it as a form of *C. Fuckelii*, with its spores merely *dwarfed* by their occurrence on dry substrata such as the spines of *Ulex* and the dry pods of *Laburnum*. Boyd found what appeared to be the same species on fallen corollas of *Ulex*. See *C. Fuckelii* and *C. Sarothamni*.

Germ. Denm. Austr. Switz.

Ulmus

Coniothyrium Karstenii All. vii. 58. *Sphaeropsis Karstenii* Sacc. Syll. xiv. 922. *Sphaeropsis Ulmi* Karst. Symb. Fenn. xxviii. 42 (*non* Sacc. & Roum).

Pycnidia gregarious, superficial, globose or ovoid-truncate, flattened at base, carbonaceous, fragile, nearly mouthless, black, about 300μ diam. Spores oblong-ellipsoid, between hyaline and olivaceous, eguttulate, 10 × 4μ.

On branches of *Ulmus*. Wrexham. *n.v.*

Recorded at the Wrexham Fungus Foray of the British Mycological Society, 1910. There is a fungus called *Sphaeropsis Ulmi* Sacc. & Roum. (Syll. iii. 305) which has spores 60–70 × 14 μ, but this is only the early state of *Macrodiplodia Ulmi* Sacc. (Syll. iii. 374).
Finland.

Coniothyrium muciferum, comb. nov. See *Aposphaeria mucifera, supra*, Vol. I, p. 140.

Pycnidia scattered, superficial, black. Spores ovoid-oblong, rounded at both ends, often biguttulate, but sometimes with either one or no guttule, dark-olive, 5–7 × 2–3 μ, immersed in a very persistent mucus.

"In the cracks of a plank of *Ulmus*, especially on the medullary rays" (Berk. in Herb.). King's Cliffe; Warwickshire. Nov.

This is probably the fungus to which Berkeley refers (Hook. Journ. Bot. Kew, v. 41), saying that he takes it to be *C. glomeratum* Corda. It is as described above; there is little of the original material left, but it is unmistakably a *Coniothyrium*, whereas Corda's *glomeratum* is an *Aposphaeria*. (See Vol. I, p. 137.) At Warley, near Birmingham, I have found the same fungus, with exactly similar spores, on bare dead wood of Ash, and it also was accompanied by an Aposphaeria. Are not these two both stages of the same species?

Viburnum

Coniothyrium Viburni Died. 578.

Pycnidia covered by the epidermis, but at length protruding at the vertex, depressed-globose, 200–250 μ diam., dark olive-brown, opening by a rather wide pore; texture thin, parenchymatous. Spores oblong or broadly ellipsoid, yellow, 4–5 × 2·5–3 μ; no visible sporophores.

On dead twigs of *Viburnum Opulus*. Lostwithiel, Cornw. (Rhodes). July.

Diedicke's fungus was on living twigs of *Viburnum Lantana*. Germ.

Vitis

Coniothyrium Diplodiella Sacc. Syll. iii. 310. All. vii. 60. Board of Agric. Leaflet no. 158. Stevens, p. 504, f. 349. *Phoma Diplodiella* Speg. Amp. Ital. no. 4.

Spots rounded or irregularly oblong, 2–8 mm. across, pale-cinereous, with a dusky border, adorned in the centre with rather crowded black points. Pycnidia gregarious, sub-

epidermal, globose, then lens-shaped, 100–150 μ diam., pallid, then brown, pierced by an impressed ostiole and surrounded by an abundant mycelium; texture thin, smoky-brown, membranaceous. Spores ellipsoid to ovoid, occasionally somewhat boat-shaped, rather obtuse at the ends, dusky-brown, with one or two guttules, $7–11 \times 5–6 \mu$; sporophores hyaline, simple or branched.

On the fruit and fruit-stalks of *Vitis vinifera*, growing under glass. Rare in this country.

This disease, the "White-rot of the Vine", sometimes in severe attacks spreads to the branch from which the bunch springs. On the Continent and in the United States it attacks Vines growing in the open air, and may become a serious epidemic. It is stated by Viala & Ravaz (Rev. de Vit. 1894, p. 197) to have an ascophorous form, *Carrinia*.

Fr. Switz. Ital. U.S.A.

MONOCOTYLEDONS, ETC.

Ephedra

Coniothyrium ephedrinum, sp. nov. *Phoma allostoma* Sacc. *p.p.* in Herb. Kew.

Pycnidia thinly scattered, oblong or globose, black, covered by the epidermis, seated on the wood, 150–230 μ long, dehiscing by a more or less compressed pore. Spores oval, very numerous, brownish, $3–4 \times 1 \mu$.

On twigs of *Ephedra andina*. Kew Gardens.

When the bark falls off, the base of the pycnidium is seen to be immersed in the wood. The species seems to be allied to *C. peradenycum* Sacc.

Gynerium

[**Coniothyrium inconspicuum** Cooke, in Grevill. xvi. 8. Sacc. Syll. x. 266. All. vii. 38.

"Pycnidia very minute, inconspicuous, in short lines, innate. Spores elliptic, continuous, brown, $10 \times 4–5 \mu$, at first on short sporophores."

On leaves of *Gynerium argenteum*. Claygate (Cooke).]

This fungus is so inconspicuous that it absolutely cannot be seen. On the original specimens there is nothing but very immature immersed mycelium, in short lines, and a superficial minute *Cladosporium*, the immature spores of which measure $10 \times 4–5 \mu$.

Heleocharis

Coniothyrium Scirpi Trail, in Scot. Nat. 1889, iv. 71. Sacc. Syll. x. 266. (Not *C. Scirpi* All. 1901, vii. 56, which is *Sphaeropsis Scirpi* Boy. & Jacz. Mat. Myc. Montpell. p. 39. Sacc. Syll. xi. 514.)

Pycnidia scattered, immersed, thin, brown, spherical, 100–150μ diam. Spores broadly fusoid, pallid-brown, 9–10 $\times$ 4–5μ.

On dead culms of *Heleocharis palustris*. Loch Achray; Inveraray (Trail). *n.v.*

The homonymous species of Allescher is described as having erumpent pycnidia and ovoid pallid-brown spores, 4 $\times$ 3μ; on *Scirpus* and dry leaves of *Acorus Calamus* in France. It might be a different species, or more likely a younger state of the present one.

Phormium

Coniothyrium Phormii Cooke, in Grevill. vii. 96 (as *C. Phormium*). *Phoma Phormii* Sacc. Syll. iii. 166. *Phyllosticta Phormii* All. vi. 161.

Pycnidia scattered, but somewhat gregarious, covered by the thin epidermis, black, shining, convex or almost hemispherical, 200–400μ diam., opening by a ragged pore beneath the slit epidermis; peridium rather thick. Spores very abundant, oval, singly rather colourless, but distinctly olivaceous in mass, 3–4 $\times$ 2μ (4 $\times$ 3μ, Cooke), immersed in a thin mucus.

On fading or dead leaves of *Phormium tenax*. Polperro (Rhodes & Rilstone). St Ives, Cornwall; Public Gardens, the Mumbles, Swansea. Apr.–Jul.

Cooke recorded it from a specimen in the University Herbarium, Edinburgh, collected in the Brussels Botanic Gardens. The spores are at first quite colourless, but gain colour by degrees; they may be seen in abundance in a freshly gathered specimen. See p. 176.

Belg.

Psamma

Coniothyrium Psammae Oud. Contr. Fl. Myc. Pays-Bas, xvi. 66; in Hedwig. 1898, p. 177. Sacc. Syll. xvi. 911. All. vii. 913.

Pycnidia scattered, immersed, then erumpent by the vertex, black, subglobose, at length rather prominent, 120–140μ diam.; peridium of several layers thick, composed of minute dark parenchymatous cells. Spores oval or oval-lanceolate, nearly colourless, then olivaceous, at length pale fuliginous-amber, often acute at the ends, eguttulate, involved in mucus, 5–8 $\times$ 3–4μ (9–10 $\times$ 4–5μ, Oud.). (Fig. 32*a*.)

On dead leaves of *Psamma arenaria*. Padstow, Cornwall and Harlech (Rhodes). Barmouth. Aug.–Jan.

A well-marked Coniothyrium, but apparently not fully developed. Most of the spores were less than 8 μ long, although some reached 10 μ or more. When the pycnidium was pressed, in the Barmouth specimens, the spore-mass issued as a globule just as in *C. Equiseti*, a sign of immaturity (?).

Holl.

Yucca

Coniothyrium concentricum Sacc. in Mich. i. 204; Syll. iii. 317. All. vii. 35. Died. p. 564, p. 552, f. 16. Mig. p. 251, pl. 33. *Phoma concentrica* Desm. in Ann. Sci. Nat. 1840, xiii. 189. Cooke, Handb. 418.

Spots large, roundish, greyish-brown, with a darker border which is rarely absent. Pycnidia epiphyllous, often concentrically arranged, lens-shaped, up to 300μ diam., usually with an imperfect ostiole; peridium rather thick, parenchymatous, sooty-brown. Spores round to ovoid, at first hyaline, then yellowish, at length sooty-olive, often uniguttulate, 4–6 × 3–4μ; sporophores not seen. (Fig. 33*a*.)

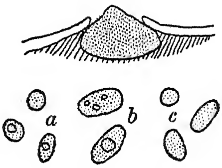

Fig. 33. *Coniothyrium*: an erumpent pycnidium, × 80. Spores of *a*, *C. concentricum*; *b*, *C. Equiseti*; *c*, *C. Obiones*; all × 600.

On living leaves of various species of *Yucca* (*gloriosa*, *recurvifolia*, *filamentosa*), looking like a dingy Phyllosticta. Common wherever the plant is grown.

The greyish ± circular patches, varying from 1 to 3 or more cm. across, are frequently bounded by a brown border, and are dotted over with the minute blackish pycnidia, most often in concentric circles. An injurious parasite; if the diseased parts are not removed and burnt, the fungus spreads, and may cause great disfigurement. It has been recorded abroad also on *Agave* (var. *Agaves* Sacc.), *Dasylirion*, *Dracaena*, and *Fourcroya*. A form, *effusa*, with the pycnidia scattered uniformly (without spots) over the *dead* leaves was found at Landulph, Cornwall, by Mr Hurst; the spores were unchanged.

Europe, Ceylon, U.S.A., India.

Equisetum

Coniothyrium Equiseti Lamb. & Fautr. in Rev. Mycol. 1896, p. 142. Sacc. Syll. xiv. 924. Bucknall, Fung. Bristol, vi. f. 2.

Pycnidia rather large, up to 500μ broad, oblong, obtuse, covered, but showing through the translucent epidermis;

texture thin, of minute yellowish nebulous cells, darker around the pore. Spores oblong, very obtuse at both ends, deep bronzy-yellow, with one central or two or more smaller guttules, 8–10 × 4–5μ. (Fig. 33*b*.)

On dead stems and sheaths of *Equisetum Telmateia*: Isle of Arran (Boyd); Leigh Woods, Bristol (Bucknall); Norfolk (E. A. Ellis); Benllech, Red Wharf Bay, Anglesey. On *E. limosum*: Dodderhill Common (Rhodes); Earlswood, Wk. Apr.–Sept.

When the pycnidium is crushed, the spores issue in a dense round purplish- or brownish-black mass.

Fr.

Pteridium

Coniothyrium Pteridis Sm. & Ramsb. in T.B.M.S. 1916, v. 244.

Pycnidia gregarious, erumpent, somewhat globose or lens-shaped, black, carbonaceous, up to 200μ diam. Spores ellipsoid or subglobose, smoky-brown, 2·5 × 1·5–2μ.

On rachis and pinnae of *Pteridium aquilinum*. Ardrossan, Ayrshire (Boyd).

Wood

Coniothyrium myriocarpum Sacc. Syll. iii. 315. Mig. 258. *Sphaeria myriocarpa* Fr. Syst. Myc. ii. 459.

Pycnidia crowded, very minute, globose, smooth, mouthless, black, shining. Spores ovoid or ovoid-oblong, rather large, fuscous (11–15 × 5–8μ in var. on *Abies*).

On wood lying on the ground. Recorded as British. *n.v.*

"Quite superficial, crowded or scattered, glabrous, collapsing when old; ostiole at length pierced." (Sacc. *l.c.*).

Fr. Germ. Swed. Finland, N. America.

There are many other species of Coniothyrium to be discovered in Britain. I have found specimens of Coelomycetes, presumably of that genus, on *Carex*, *Crataegus*, *Foeniculum*, *Iris*, *Jasione*, *Jasminum*, *Juncus*, *Olearia*, *Pinus*, *Polygonum*, and *Senecio*, to which so far no names have been attributed.

SPHAEROPSIS Lév. in Demid. Voy. p. 112 (emend. Sacc. in Mich. ii. 115).

Pycnidia immersed, then erumpent, subglobose, papillate, thick-walled, composed of firm parenchymatous cells, often becoming carbonaceous when old. Spores oval or oblong-

ovoid, continuous, brown; sporophores mostly conspicuous, hyaline or nearly so, linear-oblong.

This was Saccardo's idea of the genus, viz. practically that of a Diplodia before the spore had formed the septum. But it is now known that many (perhaps most) of the species are nothing but young states of Diplodia which when allowed to reach full development assume the normal form of that genus.

Not only is the septum slow in appearing, but the colour also need not become obvious for some time, although it is true that a faint tinge of brown is often present which can be recognised for what it is by an expert eye. The typical Diplodia-pedicel is also an aid to determination. Sphaeropsis stands to Diplodia exactly as Haplosporella does to Botryodiplodia.

Alnus

Sphaeropsis Alni C. & Ellis, New Jersey Fung. in Grevill. v. 50, pl. 80, f. 4. Sacc. Syll. iii. 299. All. vii. 8. Died. 579. Mig. 247.

Pycnidia numerous, crowded, covered, then erumpent singly or in clusters of three or four, ovoid, rather thick-walled, brown. Spores oblong-ellipsoid, dark sooty-brown, $20–25 \times 10–14\mu$; sporophores oblong or linear, as long as or shorter than the spore, colourless.

On living bark of *Alnus*. Kew Gardens (Cooke). Mar.

Though often clustered, the pycnidia of these specimens frequently stand singly, and there is no evident stroma even when they are in clusters. Their walls are often carbonaceous, and many of the spores are constricted about the middle. It is merely a young state of a Diplodia, presumably *D. Alni* Fckl. Saccardo suggested that it be placed in Haplosporella. The spores of the New Jersey form are given as $25–30 \times 10–16\mu$.

Germ. Austr. N. America.

Betula

Sphaeropsis Betulae Cooke, in Grevill. xiv. 4. Sacc. Syll. x. 256. All. vii. 9.

Pycnidia somewhat gregarious, occasionally scattered, covered by the elevated epidermis, depressed-globose, scarcely papillate. Spores ellipsoid, rounded at both ends, granular, yellowish, $23–25 \times 8–10\mu$.

On small twigs of *Betula alba*. Kew Gardens (Cooke). Apr.

The pedicel, just beneath the spore, is swollen, and when full of yellow protoplasm looks almost like a second spore beneath the first. Cooke wrongly gives the length of the spores as 30–32 μ. There is no reason why Cooke's fungus should not be considered merely a young state of *Diplodia Betulae* Westd.; it presents every character that a young Diplodia should have, even an occasional constriction in the middle of the spore. In U.S.A. it has been found on the leaves.

Hedera

[**Sphaeropsis Helicis** Cooke & Mass. in Grevill. xvi. 8. Sacc. Syll. x. 252. *Naemosphaera Helicis* All. vii. 62.

"On twigs of Ivy, in company with *Diaporthe pulla*. Kew Gardens" (C. & M.).]

This is nothing but *Melanconium Hederae*, the "species" having been factitiously engendered by imagining the spores of the "Sphaeropsis" to have come out of the perithecia of the Diaporthe. The spores are exactly identical with those of the normal Melanconium, the measurements given in Grevillea (*l.c.*) being false, and the "stroma" belonging to the Diaporthe.

Malus

Sphaeropsis malorum Berk. Outl. p. 316 (1860). ? Peck, in Rep. N.Y. State Mus. 1881, p. 36, pl. 4, f. 16–21. Sacc. Syll. iii. 294. Sm. & Ramsb. in T.B.M.S. iv. 236; and Journ. Roy. Hort. Soc. 1902–3, p. 227. Duggar, Fung. Dis. Pl. p. 350, f. 169–172. Journ. Board Agric. 1913, xx. 513. Stevens, p. 502, f. 348. Paddock, in Science, viii. 596. *Phoma malorum* Sacc. Syll. iii. 152 (1884). *Macrophoma malorum* Berl. & Vogl. Syll. Addit. 310. *Macroplodia Mali* Westd. Crypt. p. 369. Lamb. Flor. Myc. Belg. iii. 66. *Sphaeropsis Mali* Sacc. Syll. iii. 293. All. vii. 16. Mig. 248.

Pycnidia immersed, then erumpent by the papilla, usually surrounded by laciniae, depressed-conical, dark-brown, pierced at the apex. Spores oblong, continuous, brown, 22–32 × 10–14 μ (25 × 10–11 μ, Sacc.); sporophores about as long.

On stems, leaves, and fruit of *Pyrus Malus*.

It seems to do little injury here, although in the U.S.A. it is very destructive, attacking, it is said, in addition, Pear, Quince, and Hawthorn. But in our country it is only the not-fully-developed state of *Diplodia malorum* Fckl. (*q.v.*). It has been considered to be a pycnidial stage of a species of Melanops (= Botryosphaeria); see Shear, in Science, new ser. 1910, xxxi. 748.

Europe, U.S.A., Canada, India.

Pinus, see *Diplodia Pinastri* (p. 49)

Viscum

Sphaeropsis Visci Sacc. in Mich. ii. 115; Syll. iii. 295; x. 254. Grevill. xiv. 36. All. vii. 21, with fig. p. 3. Died. p. 582, p. 552, f. 19.

Mig. p. 249, pl. 32, f. 1–5. *Ceuthospora Visci* Sollm. in Hedwig. ii. 187, pl. 13, f. 1–11.

Pycnidia gregarious, immersed, somewhat prominent, globose, black, about 300μ diam., with an obtuse conical papilla, and at first white contents. Spores oblong or obovoid, dusky-olive, granulose within, often constricted about the middle, 45–55 × 18–26μ; sporophores filiform, rather short, becoming longer on losing the spore. (Fig. 34.)

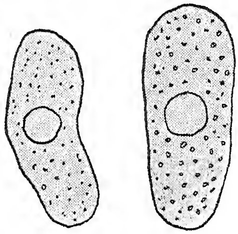

Fig. 34. *Sphaeropsis Visci*: spores, × 600.

On leaves (both surfaces) and twigs of *Viscum album*. Probably introduced with the host from the Continent.

Potebnia (Ann. Mycol. 1910, viii. 62) and Diedicke (*ibid.* 1913, xi. 47) find it to be associated with *Microdiplodia Visci* Pot. = *Diplodia Visci* (DC.) Fr. (with spores 9–10 × 4–5μ), and consider them to be, respectively, the macro- and micro-conidial stages of *Gibberidea Visci* Fckl. in company with which they occur. The Sphaeropsis is, therefore, the young state of a Diplodia or of a Botryodiplodia (? *Botr. Phoradendri* Petr.). Saccardo suggests (Syll. ii. 133) still another pycnidial stage, with fusoid spores, 7-septate, 32 × 6μ.

Fr. Belg. Germ. Austr. Switz. Swed. Russ.

[**Sphaeropsis herbarum** Cooke & Massee, in Grevill. xvi. 78 Sacc. Syll. x. 251. *Coniothyrium Cookeanum* All. vii. 58.

"On herbaceous stems of Compositae and Umbelliferae. Epping" (Cooke and Massee).]

These specimens are only the excreta of small insects, containing Sphaeropsis-like spores, but simply sticking to the stems, not immersed in them.

[**Sphaeropsis lignicola** Cooke & Massee, in Grevill. xvi. 8. Sacc. Syll. x. 259. All. vii. 20.

"On decorticated branches. Kew" (Cooke and Massee).]

This is a species of *Rosellinia*, having evident asci in abundance.

For other reputed British *Sphaeropses*, see Indexes, and for *Sphaeropsis Ulmi*, see p. 65.

APOSPHAERIOPSIS Died. in Ann. Mycol. xi. 89.

Pycnidia superficial, mostly gregarious, dark-brown; texture carbonaceous, brittle. Spores continuous, dark-coloured.

This genus is supposed to resemble Aposphaeria, but to differ in its coloured spores.

Plurivorous

[**Aposphaeriopsis fusco-atra** Died. p. 584, p. 552, f. 21 *a–c*.

"Pycnidia gregarious, densely crowded, completely superficial, subglobose or irregular, very thin-walled, blackish-brown, 200–250μ diam.; wall of minute cells, opaque and fragile. Spores filling the whole cavity, brown, globose or ovoid, mostly incurved on one side so as to be somewhat kidney-shaped, with one very minute hyaline oil-drop, 4–5μ diam.; sporophores wanting."]

This description, by Diedicke (*l.c.*), is erroneous, for his fungus is a pyrenomycete (Perisporiacei) of which the asci have disappeared. It is *Cephalotheca reniformis* Sacc. & Th., which has now been found in Richmond Park by E. W. Mason, and at the Birmingham University, Edgbaston, by C. G. C. Chesters, on old wood of *Fagus* and *Quercus*. For this information I am indebted to Mr Chesters.

NAEMOSPHAERA Sacc. Syll. iii. 198.

Pycnidia separate, covered or subsuperficial, black, between membranaceous and carbonaceous, with a distinct beak. Spores unicellular, oblong-ovoid, tinged with olivaceous-brown, when mature.

It is a Sphaeronaema with a tinge of colour in the spores.

Pinus

Naemosphaera rostellata Sacc. Syll. x. 260. All. vii. 62, with fig. on p. 5. *Coniothyrium rostellatum* Grove, in Journ. Bot. 1886, p. 135, pl. 266, f. 2.

Pycnidia globose, with a short cylindrical neck, or ovoid and tapering into the neck, 150–200μ broad, 250μ high, covered except the neck, then subsuperficial, black, rugulose, scattered or sometimes two or three semi-connate; texture

parenchymatous, olivaceous, subpellucid. Spores numerous, subglobose to ovoid, pale-olivaceous, $4–6 \times 2{\cdot}5–3\,\mu$. (Fig. 35.)

On both surfaces of the scales of cones of *Pinus silvestris*, *P. austriaca*. King's Norton; Hereford. May, Aug.

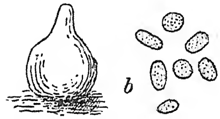

Fig. 35. *Naemosphaera rostellata*, × 100; *b*, spores of the same, × 600.

Distinguished by its conspicuous beak. The Hereford specimens showed, in the same conceptacles, the distinct beginnings of asci, but with quite immature spores.

[The species *Chaetomella atra* Fckl. (besides having external setae) differs from Aposphaeriopsis in possessing fusoid spores, $12–15 \times 2–3\,\mu$, on very long sporophores. It is found abroad on Grasses and Carex, but so far has not been seen in Britain.]

CYTOPLEA Bizz. & Sacc. in Fl. Critt. Ven. *apud* Syll. iii. 325.

Stroma erumpent, subsuperficial, when confluent forming an effused crust, irregularly multilocular within; loculi often

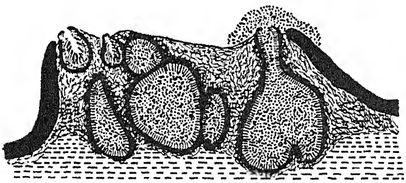

Fig. 36. *Cytoplea Juglandis*, on *Ulmus*: vertical section through a stroma, showing five pycnidia and, on the left, two young perithecia, × 20. From a drawing by Mr Chesters.

cuboidal. Spores ovoid-oblong, continuous, dusky-olivaceous, at first in short chains; sporophores short.

Plurivorous

Cytoplea Juglandis Petr. in Ann. Mycol. 1923, xxi. 5. *Naemospora Juglandis* Schum. Pl. Saell. 1803, ii. 178. *Cytospora Juglandis* Sacc. Syll. iii. 267. Mig. 198. *Haplosporella Juglandis* S. & S. Syll. xvi. 915.

Pycnidia subglobose, ostiolate or even beaked, ± confluent, immersed in a stroma which is pustular, covered, then erumpent, sprinkled with a reddish scurfy meal, black, rugged,

1 mm. broad or more. Spores very numerous, roundish or oval-cylindric, obtuse at both ends, hardly ever guttulate, clear pallid-olivaceous, $5–8 \times 2{\cdot}5–4\mu$ ($9–10 \times 4–4{\cdot}5\mu$, Chesters), held at first in short chains by mucus, but soon separating; sporophores crowded, oval-oblong, erect, straight, quite colourless, $10–15 \times 3–4\mu$, rising from a dense dark-celled stratum. (Figs. 36, 37.)

On bark of *Ulmus*, in the grounds of the Imperial Mycological Institute at Kew. On *Ulmus* and *Acer*, Kew and Richmond; on *Juglans*, Mickleham (Mason). Cornwall.

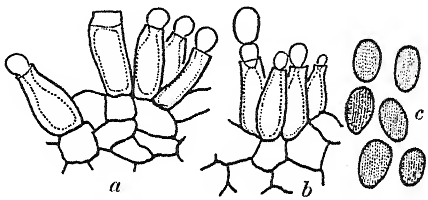

Fig. 37. *Cytoplea Juglandis*, on *Ulmus*: *a*, section of hymenium, showing sporophores and young spores; *b*, the same, taken from a culture; *c*, mature spores; all ×600. From a drawing by Mr Chesters.

The pycnidial stage of *Thyridaria rubro-notata* (B. & Br.) Sacc., which may occur in the same stroma. The reddish scurf disappears with age or wear. The fungus is recorded (in one stage or other) on *Aesculus*, *Ribes*, *Rhamnus*, etc. also. The references to *Phoma ulmicola* Berk. Journ. Bot. 1853 (it is *not* called *ulmigena* there) by Tulasne and Petrak are incorrect; that species is an Aposphaeria, for which see Vol. I, p. 140.

Fr. Holl. Germ. Moravia.

Tamaricaceae

Cytoplea caespitulosa, comb. nov. *Coniothyrium caespitulosum* Sacc. in Mich. i. 206; Syll. iii. 311. All. vii. 57 (on Tamarix). *Haplosporella caespitulosa* Died. p. 588, p. 552, f. 26.

Forma **Myricariae.**

Dothiorella Myricariae Cooke & Mass. in Grevill. xvi. 7. Sacc. Syll. x. 231; xiv. 911. All. vi. 523; vii. 860. Died. 297. Mig. 215. *Doth. Myricariae* C. & M., f. *germanica* All. in Hedwig. xxxvi. (161); Krypt. Flor. vii. 860.

"Stomata gregarious, verruciform, erumpent. Pycnidia not numerous in each stroma, crowded, minute, subpapillate, black. Spores oblong-ovoid, $8–10 \times 6\mu$" (C. & M.). (Fig. 38.)

On twigs of *Myricaria dahurica*. Kew Gardens.

On these twigs at Kew there are at least three fungi: (1) is like *Hendersonia sarmentorum* Westd.: (2) seems to be *Cytospora Tamaricis* Brun. (see Vol. I, p. 286) or *C. Greschikii* Bres. with shorter spores (colourless, $8 \times 2\,\mu$). The (3) is presumably what the authors intended, but its spores are oblong-ovoid, yellowish-green in mass, $5–8 \times 3\,\mu$, in fact the spores of a Coniothyrium. These spores often occurred in the same pustule with the Cytospora.

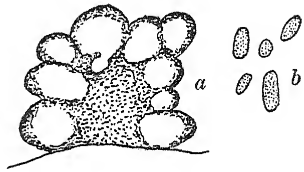

Fig. 38. *Cytoplea caespitulosa*: *a*, vertical section of a stroma, $\times 30$ (after Diedicke); *b*, spores, on *Tamarix*, $\times 600$.

Obviously the Kew Gardens form is exactly the same as the Berlin form found by Sydow on *Myr. germanica*, and named by Allescher in Hedwigia as above. They both have coloured spores, and are as it were a clustered state of *Coniothyrium Tamaricis* Oud.; *vide supra*, p. 9.

Von Höhnel, who considers that *Clisosporium Tamarisci* Mont. (see *Phoma Tamarisci* Sacc. in Vol. I, p. 109) is part of the same species, wisely lumps the whole complex of these forms, simple and compound, together (under the name *Sclerothyrium Tamarisci* (Mont.) v. Höhn. in Hedwig. 1918, lx. 181).

Germ.

HAPLOSPORELLA Speg. Fung. Arg. iii. 34.

Pycnidia globose, papillate, blackish-brown, arranged in tufts on a stroma or sunken in it. Spores ovoid or oblong, continuous, fuliginous-brown; sporophores linear, usually short.

This genus is a congeries of oddments. It is supposed to be a compound Coniothyrium or Sphaeropsis, or a Dothiorella with coloured spores. But the fungi that have been placed in it are very diverse from one another; many or all of them are merely young states of species that belong elsewhere.

Aesculus

Haplosporella Aesculi Cooke & Mass. in Grevill. xvi. 9. Sacc. Syll. x. 273. All. vii. 69.

Pycnidia small, densely crowded in elliptical or angular erumpent clusters 5 mm. long, seated on a parenchymatous stroma, black, pierced by a minute pore. Spores ellipsoid, pale olive, $5–7 \times 2{\cdot}5–3\,\mu$.

On branches of *Aesculus*. Kew Gardens. Resembling a Cucurbitaria in habit.

Ampelopsis

Haplosporella viticola Cooke & Mass. in Grevill. xvi. 9. Sacc. Syll. x. 273. All. vii. 70.

Pycnidia rather large, subglobose, dull-black, scarcely pierced, arranged ten or more together in erumpent elliptical pustules which lie more or less in longitudinal series. Spores large, oval or shortly ellipsoid, yellow-brown, $20–25 \times 10–14 \mu$; sporophores thick, about as long as the spore.

On dead stems of *Ampelopsis* (*Vitis*). Kew Gardens. May.

"Having the habit of a *Botryosphaeria*" (C. & M.). The size of the spores is given in the original as $30–35 \mu$ long. Although none but continuous spores were seen, there were several indications that the spores might at length become 1-septate; they were at first pale-yellowish, and exactly as in young *Botryodiplodia caespitosa*, to which genus they probably belong; see *infra*, p. 68.

Bark

Haplosporella melogrammata, comb. nov. *Sphaeropsis melogrammata* Cooke, *ined.*

Pycnidia solitary or clustered in little groups or short lines, erumpent, globose-conical, black, rugose, papillate, carbonaceous, brittle, about $300–500 \mu$ diam. Spores oval or ellipsoid, rounded at both ends, thick-walled, sometimes with a large guttule, very dark brown, almost opaque, $23–25 \times 15–18 \mu$.

On bark. Forden (Vize). Autumn.

Allied to *H. viticola* C. & M. The spores of both remind one of the teleutospores of a Uromyces. It is probably a young form of a Botryodiplodia.

[**Haplosporella Baxteri** Cooke & Mass. in Grevill. xvi. 8. Sacc. Syll. x. 275. All. vii. 74.

"Forming erumpent clusters of rather large elongated obconical shining black perithecia, which are pierced at the apex. Spores elliptical, straight or curved, continuous, rounded at the ends, brown, $22–30 \times 8–10 \mu$." (C. & M.)

On dead branches. Oxford (Baxter).] Feb.

On examining the original specimens, I find the only spores discoverable to be in asci. The perithecia are not "obconical", and the spores measure about $18–20 \times 5 \mu$; otherwise the description is correct.

PHAEODIDYMAE

Spores dark-coloured, uniseptate.

I. Pycnidia mostly singly.

A. Pycnidia at first covered, then erumpent.

1. Pycnidia glabrous.

a. Spores without a mucous envelope.

† Spores small; sporophores inconspicuous . . . . *Microdiplodia*

†† Spores larger; sporophores conspicuous . . . . *Diplodia*

b. Spores very large, surrounded by a mucous envelope . . . . *Macrodiplodia*

2. Pycnidia beset with hairs . . . . . [*Chaetodiplodia*]

B. Pycnidia superficial from the first . . . . . . *Diplodiella*

II. Pycnidia tufted or seated on a basal stroma . . *Botryodiplodia*

A Chaetodiplodia has not yet been found in Britain.

MICRODIPLODIA All. vii. 78.

Pycnidia scattered or gregarious, covered, then erumpent, often papillate, mostly thick-walled, brownish-black; texture of small cells, parenchymatous. Spores oblong or subcylindric, 1-septate, seldom constricted, pale- or dark-brownish, not more than 15μ in length; sporophores not conspicuous.

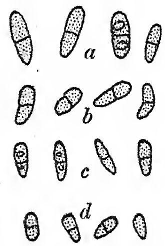

Fig. 39. *Microdiplodia*: *a*, *M. laurina*; *b*, *M. Narthecii*; *c*, *M. Nissoliae*; *d*, *M. ononidicola*; spores, all × 600.

The species in this genus are as it were miniature copies of a larger-spores Diplodia in company with which they often grow, and in some cases it has been proved that both forms belong to the same Pyrenomycete. But the two forms do not seem in all cases to shade into each other, and must then be considered to be two distinct stages of development, though there are exceptions to this statement. Cf.

Tassi, in Bull. Lab. Ort. Bot. Siena, 1902, p. 29, where he gives 79 species.

Acer

Microdiplodia subtecta All. vii. 80. Sacc. Syll. xviii. 325. Died. p. 590, p. 552, f. 33. Mig. 311. *Diplodia subtectoides* Peck, in 48th Rep. N.Y. State Mus. 1894, p. 112.

Pycnidia gregarious, covered, elevating and bursting the epidermis, globose, thick-walled, pierced by a minute pore, up to 500μ diam. Spores cylindric-oblong to ovoid, very obtuse at both ends, not constricted, pale-brown, 7–12 × 3–4μ; sporophores not seen.

On bark of twigs of *Acer campestre*. Darenth (Cooke). Iccombe, Gloucestershire (Rhodes).

Occurring with *Diplodia subtecta*, both here and on the Continent. Germ. Denm. Austr.

Foeniculum

Microdiplodia perpusilla, comb. nov. *Diplodia perpusilla* Desm. in Ann. Sci. Nat. 1846, vi. 68. Sacc. Syll. iii. 365. *Sphaeria Foeniculi* Cast. Cat. Pl. Marseille, 176.

Pycnidia very densely scattered, extremely numerous, 100–160μ diam., immersed, then erumpent by a minute papilla, globose-lenticular, black; texture thick, dark, opaque. Spores oblong-ellipsoid, rounded or subacute at the ends, 1-septate, hardly constricted, yellowish or pale fuscous-brown, 8–11 × 4–5μ, sometimes with one loculus a little longer than the other.

On old stems of *Foeniculum vulgare*. Talland Bay, Cornwall (Rhodes). Polperro (Rilstone). Apr. May.

No doubt the micro-stage of *Diplodia foeniculina* Thüm. (Sacc. Syll. iii. 364).
Fr.

Glaucium

Microdiplodia Glaucii, comb. nov. ? *Diplodina Glaucii* Cooke & Mass. in Grevill. xvii. 79. Sacc. Syll. x. 314. All. vi. 688. ? *Ascochyta Glaucii* Died. 383.

Pycnidia scattered, minute, globose, black, covered by the epidermis which is at length pierced by the minute ostiole; texture thin, parenchymatous. Spores ellipsoid, obtuse at both ends, scarcely constricted, pale-fuscous, 5–6 × 2–2·5μ.

On dead stems of *Glaucium flavum* (*fulvum*). Kew Gardens. Feb.

The size of the spores given by Cooke and Massee (12–13 μ long) is greater than in the spores I have seen. They are pale translucent fuscous, at first continuous, then with a very delicate median septum. Germ. ?

Hedera

Microdiplodia hedericola All. vii. 87. *Diplodia hedericola* Sacc. Syll. iii. 360.

Pycnidia densely gregarious, usually epiphyllous, globose-depressed, scarcely papillate, covered by the epidermis, black. Spores obovoid, rounded above, 1-septate, not constricted, biguttulate, fuliginous, $10–12 \times 5–6 \mu$; sporophores linear, hyaline, $5–6 \times 2 \mu$.

On dead leaves of *Hedera Helix*. Chepstow (Rees). Suffolk (E. A. Ellis). Mar.

The microstage of *Diplodia Hederae* Fckl. (*q.v.*). See also *Botryodiplodia caespitosa*, *infra*, p. 69.

Ilex

Microdiplodia microsporella All. vii. 76, with fig. Mig. p. 310, pl. 39, f. 10, pl. 40, f. 4–7. *Diplodia microsporella* Sacc. Syll. iii. 357. *D. microspora* Sacc. in Mich. i. 96, 517; Fung. Ital. 99 (*non* B. & C.).

"Pycnidia loosely gregarious, covered by the swollen epidermis, then semi-erumpent, subglobose, depressed-papillate; contents black. Spores straight or rarely inequilateral, oblong, rounded at both ends, 1-septate, hardly constricted, fuliginous-ochraceous, $10–15 \times 4–5 \mu$, rising from a colourless basal stratum" (Sacc. Syll.).

On bark of branches of *Ilex Aquifolium*, Suffolk (E. A. Ellis).

This is a composite species, sheltering a host of different forms from which already a large number have been withdrawn. The specimen on *Ilex* has pycnidia about 150 μ diam., black. Spores mostly rounded at both ends or tapering below, not constricted, dark-brown when mature, $10–13 \times 4–5 \mu$.

Other forms of this species have been recorded abroad on: *Acacia*, *Araucaria*, *Berberis*, *Carpinus*, *Cerasus*, *Corylus*, *Eucalyptus*, *Fraxinus*, *Melia*, *Myrtillus*, *Prunus*, *Quercus*, mostly perhaps deserving of segregation, as has been done already by Diedicke for those on Carpinus, Corylus, and Fraxinus.

Juncus

Microdiplodia Junci Died. in Pilz. Brand. p. 595, p. 552, f. 31. Mig. 313.

Pycnidia loosely gregarious, covered by the epidermis and at length piercing it by the minute ostiole, globose or subconical, 100–150μ diam.; texture rather thick, dark-brown, of very minute cells. Spore elliptic-ovoid, hardly at all constricted, biguttulate, yellowish-brown, 6–8 × 3·5–4·5μ; sporophores filiform, about as long as the spore and 1μ thick.

On dry sheaths of *Juncus maritimus*. Pwllcrochan, Pemb. (Rhodes). May.

Germ.

Lathyrus

Microdiplodia Nissoliae, sp. nov.

Pycnidia few, scattered, immersed, globose-depressed, then protruding the vertex through a ragged pore, black, shining, about 200μ diam. Spores linear-oblong, obtuse at both ends, 1-septate, not at all constricted, faintly curved, dark-brown, biguttulate, 8–10 × 2·5–3μ (11 × 4μ, Rhodes). (Fig. 39*c*.)

On dead stems of *Lathyrus Nissolia*. Rous Lench, Worcs. (Rhodes). Oct.

Laurus

Microdiplodia laurina, comb. nov. *Diplodia laurina* Cooke & Harkn. in Grevill. ix. 83 (1881), *nec* Westd. *nec* Sacc. *Diplodia Harknessi* Sacc. Syll. iii. 363 (1884). *Microdiplodia Harknessi* Tassi, in Bull. Lab. Ort. Siena (1902).

Pycnidia epiphyllous or on branches, scattered, punctiform, convex, blackish-brown. Spores ellipsoid, 1-septate, brownish, 10–12 × 4μ. (Fig. 39*a*.)

On a dead branch of *Laurus nobilis*. West Kilbride, Ayrshire (Boyd). Aug.

The micro-stage of *Diplodia laurina* Sacc. Syll. iii. 348.
Fr. Ital. U.S.A.

Ligustrum

Microdiplodia Mamma All. vii. 88. Sacc. Syll. xviii. 327. Died. 595. Mig. 314. *Diplodia microsporella* Sacc. Syll. iii. 357, *p.p.*

Pycnidia loosely gregarious, covered by the swollen epidermis, then semi-erumpent, globose-depressed, but papillate; contents black. Spores oblong, straight or rarely inequi-

lateral, 1-septate, hardly constricted, smoky-ochraceous, 8–15 × 4–5 μ; sporophores inconspicuous, rising from a hyaline basal stratum.

On bark of twigs of *Ligustrum ovalifolium*. Kew Gardens.

The micro-stage of *Diplodia Mamma* Fckl. = *D. Ligustri* Westd. Possibly an early stage of one of the forms of *Melomastia Friesii* Nits.

Belg. Holl. Germ. Ital.

Magnolia

Microdiplodia Magnoliae, sp. nov.

Pycnidia similar to those of *Diplodia Magnoliae*, but smaller (100–180 μ) and rather more closely gregarious. Spores also similar in shape and colour, but measuring only 10–11 × 4–5 μ.

On dead leaves of *Magnolia grandiflora* (causing no "spots"), Hadzor Hall, Droitwich (Rhodes & Grove), Oct. 1930. Also at the same place, on the twigs (Rhodes), Feb. 1931.

The micro-stage of *Diplodia Magnoliae* Westd. which grew upon the same plant at Hadzor. Cf. *Microdiplodia punctifolia* Sacc. Syll. xviii. 324 = *Diplodia punctifolia* D'Alm. & Cam. in Revist. Agron. 1903, p. 92, pl. 10, f. 3, 4, on living leaves of *Magnolia* at Lisbon (spores 10–12·5 × 5–6 μ).

Narthecium

Microdiplodia Narthecii All. vii. 89. Died. 596. Mig. 314. *Diplodia Narthecii* S. B. & R. in Bull. Soc. Roy. Bot. Belg. 1886, p. 180. Sacc. Syll. x. 291.

Pycnidia scattered, immersed, covered by the epidermis which is then pierced by the papilla, black, 150–200 μ diam.; texture rather thin, brown, loosely parenchymatous, darker round the pore. Spores ovoid or ellipsoid, colourless, then fuscous-brown, 1-septate, not constricted, 7–10 × 3–5 μ; sporophores not seen. (Fig. 39*b*.)

On dead peduncles of *Narthecium ossifragum*. Sychnant Pass, Conway; Harlech; Goss Moor, Yorks. (Rhodes). Arthog Bog, Barmouth. Co. Dublin; etc. Apr.–Jul.

Belg. Germ.

Obione

Microdiplodia Obiones, sp. nov.

Pycnidia scattered, round, rather thin-walled, black, immersed, about 200 μ diam., showing black through the thin

epidermis and at length protruding the vertex. Spores dark-brown, at first lumpy or irregularly globose, 10μ across, then ovoid or oval, 1-septate, the loculi usually $\pm$ unequal, 12–16 × 8–10μ; no sporophores seen.

On dead stems of *Obione portulacoides*. Chesil Beach, Dorset (Rhodes). May.

Some of the spores developed three septa. Cf. *Camarosporium Obiones*, and *Microdipl. Henningsii, infra*.

Ononis

Microdiplodia ononidicola Rhodes, *in litt. Coniothyrium olivaceum* var. *Ononidis* All. vii. 43.

Pycnidia densely scattered, roundish or more often oval, brownish-black, 120–150μ wide, pierced by a broad pore; texture of parenchymatous cells up to 10μ wide. Spores oval or oblong-oval, rounded at both ends, pale fuscous-yellow, then fuscous-olive, often with a minute central guttule, for a long time continuous, about 5 × 2μ, ultimately 1-septate, 6–8 × 2–3μ (5–7 × 4–5μ, Rhodes). (Fig. 39*d*.)

On dead stems of *Ononis arvensis*, cliffs at Looe and sea-shore at Llandanwg (Rhodes). On *Ononis spinosa*, Haselor Hill, Evesham (Rhodes). Jul. Aug.

Exactly simulates Coniothyrium when young, and therefore is = Allescher's var. of *C. olivaceum*.
Germ.

Palmae

Microdiplodia Palmarum Died. in Ann. Mycol. 1913, xi. 47; and Pilz. Brand. 592. *Coniothyrium Palmarum* Cord. Icon. Fung. iv. 38, pl. 8, f. 106. Sacc. Syll. iii. 318; x. 266. All. vii. 45, with fig. on p. 4. Cooke & Mass. in Grevill. xvi. 8. *C. Chamaeropis* Sacc. & Syd. Syll. xiv. 925. ? *C. borbonicum* Thüm. Contr. Myc. Lusit. ii. 44. Sacc. Syll. iii. 318. *Microdiplodia Passeriniana* All. vii. 91. Mig. 312. *Diplodia Passeriniana* Thüm. Fung. nonn. Ital. nov. *apud* Sacc. Syll. iii. 371. *D. depazeoides* Dur. & M. Flor. Alg. 575, *p.p.*

Pycnidia subepidermal, scattered, small, subglobose, elevating and cracking, but scarcely piercing, the epidermis. Spores ovoid, brown, 8 × 4–5μ, at length 1-septate, not constricted, 8–11 × 3·5–4·5μ; sporophores indistinct.

On leaves of *Chamaerops humilis*. Kew Gardens (Cooke).

The description here given is taken from Cooke's specimens, but even on them the brown spots mentioned by Corda are faintly visible.

The difference is one of age only. The spots of Thümen's *D. Passeriniana* are dry, dingy yellow, red-bordered, and occupy especially the fading tips of the leaves; it occurred on *Chamaerops* and *Phoenix*. Corda's species was on leaves of *Chamaerops humilis* in Italy and of *Phoenix dactylifera* in Portugal, on brown spots often bordered with red.

Fr. Germ. Port. Ital. Algeria, India.

Pinus

Microdiplodia conigena All. vii. 79. Mig. 311.

Pycnidia gregarious, often confluent, immersed, then erumpent, black. Spores oblong, subacute at both ends, fuscous-brown, 1-septate, hardly constricted, $8–10 \times 5–6\mu$, separating easily at the septum.

On decaying leaves of *Pinus*. On the dunes, Formby, Lancs. (Travis). Apr.

The micro-stage of *Diplodia conigena* Desm. = *D. Pinastri* Grove, *q.v.* Allescher's record was on cone-scales of *Pinus silvestris* and of *Abies*.

Germ. Ital.

Rhamnus

Microdiplodia Frangulae All. vii. 94. Sacc. Syll. xviii. 325. Died. 597. Mig. p. 315, pl. 39, f. 5–9.

Pycnidia scattered or gregarious, erumpent, globose, raising the epidermis conically, rather thin-walled, 450μ diam. Spores cylindric-oblong, obtuse at both ends, at first biguttulate, then 1-septate, hardly constricted, yellowish, at last dusky-brown, $7–13 \times 3{\cdot}5–5\mu$; sporophores short.

On branches of *Rhamnus Frangula*. King's Lynn (Plowright).

The pycnidial stage according to Tulasne's figure of *Karstenula rhodostoma* Speg. = *Massaria rhodostoma* Tul.; figured by Tulasne in Carp. ii, pl. 25, f. 3. It is said by some to be accompanied by *Diplodia Frangulae* Fckl., but that is reputed to be the pycnidial stage of *Cucurbitaria Rhamni* Fckl. Which is right?

Germ.

Salix

Microdiplodia Salicis Died. 598. Grove, in Journ. Bot. 1922, p. 81. Mig. 316.

Pycnidia gregarious, occupying long stretches of the twigs, covered, at length bursting the epidermis at the summit, depressed-globose, thick-walled, $60–70\mu$ diam.; peridium very

dark brown, with an indistinct pore. Spores shortly cylindric or oblong, with rounded ends, scarcely or not at all constricted, brown, 8–12 × 3·5–4·5μ (12–14 × 3μ, Ellis).

On dry dead branches and twigs of *Salix*, in company with *Diplodia salicina* Lév. Cheshire (Ellis). Bagshot Woods. Aug.–Oct.

Germ.

Solanum

Microdiplodia obsoleta All. vii. 95. *Diplodia obsoleta* Karst. Symb. Myc. Fenn. xv. 157. Sacc. Syll. iii. 366. Trail, in Scot. Nat. 1885, p. 128.

Pycnidia subgregarious, covered by the epidermis, nearly spherical, 100–200μ diam., usually with a small papillate ostiole perforating the epidermis, glabrous, black. Spores oblong or subellipsoid, straight or gently curved, sometimes unequal-sided, yellowish, 7–10 × 2–3μ; septum very indistinct or none.

On dead haulms of *Solanum tuberosum*. Aberdeen (Trail). *n.v.*

Finland.

Suaeda

Microdiplodia Henningsii Staritz, *apud* Died. 593. Mig. 312.

Pycnidia subepidermal, scattered or arranged ± in rows, subglobose, black, then erumpent by the vertex, 200–250μ diam. Spores colourless, then brown, at first continuous, lumpy or irregularly globose, about 8μ wide, then 1-septate, rounded above, the lower loculus usually smaller and more pointed (thereby making the loculi markedly unequal), straight or somewhat bent, about 10 × 3·5μ (10–14 × 4–5μ, Died.); no sporophores seen.

On dead stems of *Suaeda fruticosa*, Trwyn-y-Penrhyn, Penmon, Anglesey (Rhodes). Aug.–Nov.

This species was first found by Staritz, in Germany, on *Chenopodium album*. See *Microdiplodia Obiones, supra.*

Germ.

DIPLODIA Fr. Summ. Veg. Scand. 416.

Pycnidia at first covered, then erumpent, subglobose, mostly papillate, thick-walled, formed of blackish-brown parenchyma outside, ± hyaline in the inner layers. Spores 1-

septate, brown, often with a large guttule in each loculus especially when young, sometimes ± constricted at the septum, mostly over 15μ long; sporophores straight, usually stout, obtuse, hyaline, generally persistent and conspicuous.

The structure of the pycnidial wall is like that ascribed to Sphaeropsis, and of the sporophores also. Usually the spores mature slowly and at different rates, so that spores of all ages may be found side by side; they are at first colourless, then yellowish or brownish, continuous, then 1-septate, and finally dark-brown—but upon no fixed plan. Most of the fungi called Sphaeropsis by the older authors were merely young states of Diplodia.

Some species, formerly placed in the genus and resembling Saccardo's *D. microsporella*, are now classed under a separate name, Microdiplodia (*q.v.*). They are distinguished by little except their smaller size. Many species of Diplodia tend to be botryosely aggregated and to possess the beginnings of a stroma; these verge upon Botryodiplodia, and link the two genera together.

The majority of the species of Diplodia and Botryodiplodia are extremely similar to one another, especially in regard to the spores. They can be discriminated only by the host-plant. But the same fact may be observed here, that strikes the observer of nature in other genera of the Coelomycetes—a shrub can be seen to be badly attacked by a Diplodia, and yet surrounding shrubs may show no sign of infection although they belong to a species which, in other localities, can be found abundantly infested with a Diplodia having spores apparently exactly like those of the first-mentioned. Hence, in the total absence of experimental evidence on this point, the Diplodias on different hosts will be here listed under different names. They are often known to be pycnidial stages of species of Otthia or Cucurbitaria, and then they might be distinguished by the ascophorous state. The species are arranged here in the simple alphabetic order of their host-genera.

Plurivorous

Diplodia herbarum Lév. in Ann. Sci. Nat. 1846, v. 292. Cooke, Handb. 431. Sacc. Syll. iii. 370. All. vii. 110, with fig. Died. 638. Mig. p. 320, pl. 39, f. 1–4. *Sporocadus herbarum* Cord. Icon. Fung. iii. 23, pl. 4, f. 63.

Pycnidia caulicolous, gregarious, covered, then erumpent, globose-oblong, convex, then depressed, black, about 200μ

diam. Spores oblong, gently constricted, smoky-brown, 20–25 × 9–12 μ; sporophores about as long.

On stems of *Brassica*, *Dactylis*, *Galium*, *Lappa*, *Urtica*, and other herbaceous plants. Rather common; England, Scotland, Ireland, but no doubt merely a collective species.

Among the hosts recorded abroad are *Artemisia*, *Campanula*, *Centaurea*, *Dianthus*, *Ferula*, *Gossypium*, *Lactuca*, *Lilium*, *Marrubium*, *Mentha*, *Thalictrum*, *Trachelium*, etc. Some of these have spores intermediate between this genus and Microdiplodia.

Europe, Algeria, U.S.A.

Diplodia vulgaris Lév. in Ann. Sci. Nat. 1846, v. 291. Cooke, Handb. 431. Sacc. Syll. iii. 370. B. & Br. in Ann. Nat. Hist. 1850, v. 372.

"Pycnidia globose, innate, gregarious, covered by the epidermis, which is at length fissured, sometimes in a stellate manner; ostiole rather prominent."

On twigs of various trees (*Corylus*, etc.). Highgate; Batheaston; Barston; Bolton Woods; Wyre Forest; etc.

A useless collective name; in herbaria all sorts of Phaeodidymae are placed under this name.

Acer

Diplodia acerina Cooke & Mass. in Grevill. 1890, xix. 8 (*non* Lév.). Sacc. Syll. x. 278. All. vii. 100. Died. 602. Mig. 318.

"Pycnidia somewhat scattered, furnished with a globose papilla, covered, black, inconspicuous. Spores rounded at both ends, constricted, brown, 17 × 9 μ.

"On bark of *Acer campestre*."

Cooke says (*l.c.*) that he found this Diplodia with *Leptorrhaphis acerina* Rehm, Ascom. no. 197, and assigns it to Britain and Germany. There are Diplodia-spores in Rehm's exsiccatum, measuring 12–15 × 5–6 and thus approaching *Microdiplodia subtecta* All. or *M. microsporella* All. No specimens of Cooke are preserved in the Kew herbarium; the species should be merged in *D. subtecta*.

Holl. Germ.

Diplodia subtecta Fr. Summ. Veg. Scand. 417 (1846). Sacc. Syll. iii. 331. All. vii. 99. Died. p. 602, p. 552, f. 44. Mig. 318. *D. Aceris* Fckl. Symb. Myc. 171. *D. acerina* Lév. in Ann. Sci. Nat. 1846, v. 290 (*non* C. & Mass.). *D. petiolorum* Sacc. Syll. iii. 359. All. vii. 99.

Pycnidia gregarious, immersed, then erumpent, arranged

in linear rows, globose, with a small papilla, black, up to 500μ diam. Spores ellipsoid-oblong, constricted, smoky-brown, 20–25 × 10μ; sporophores oblong, nearly as long as the spore (5–10 × 1·5μ, soon disappearing, Died.).

On bark of branches of *Acer campestre*. Bedford; Norfolk; Northamptonshire; Worcestershire; etc.

Recorded abroad on other species of *Acer*, e.g. *A. Pseudoplatanus*. Said by Fuckel to be the pycnidial stage of his *Cucurbitaria protracta*.

D. acerina Cooke & Mass. is a less conspicuous fungus with slightly smaller spores; *D. minutissima* Otth is no doubt the same. Cf. also *D. atrata*, on *A. Negundo*.

Europe, N. America.

Diplodia atrata Sacc. Myc. Ven. no. 1204; Syll. iii. 331. All. vii. 99. Died. 602. Mig. 318. *Sphaeria atrata* Desm. in Ann. Sci. Nat. 1842, xvii. 105.

Pycnidia minute, densely scattered, globose, about 200μ diam., somewhat shining, covered, the papillate ostiole piercing the epidermis only by the pore; contents white, then smoky-brown. Spores ovoid-oblong, constricted at the septum, dark smoky-brown, 22–25 × 9–12μ, at length expelled and forming a wide blackish stain on the matrix; sporophores indistinct (?).

On dead branches of *Negundo aceroides* (*Acer Negundo*). Kew Gardens. Hadzor Hall, Droitwich.

It is uncertain whether or not this is distinct from *D. subtecta*; I think not. Brunaud assigns to it a var. *Pseudoplatani*, which has so far not been found in Britain, but does not differ much from the type.

Fr. Holl. Germ. Denm. Austr. Ital. Roumania.

Aesculus

Diplodia Aesculi Lév. in Ann. Sci. Nat. 1846, v. 290. Cooke, Handb. 432. Sacc. Syll. iii. 331. All. vii. 100. Died. 603. Mig. 319.

Pycnidia loosely gregarious, immersed, globose, black, 300–400μ diam., covered by the at length cleft epidermis, pierced by a small pore. Spores ellipsoid-oblong, rather obtuse at both ends, 1-septate when mature, constricted, biguttulate, smoky-brown, 20–24 × 8μ; sporophores linear.

On fallen branches of *Aesculus Hippocastanum*. Kew Gardens; Highgate; Jedburgh; etc. Feb.–Jun.

The young spores pass through all the usual phases and remain hyaline and 1-celled for a long time. On the fruits there are found a smaller form, var. *capsularum* Brun., in France (spores 15–18 × 8 μ) and one with slightly larger spores, *D. carpogena* Pass., in Italy (spores 25–30 × 10 μ).

Fr. Belg. Holl. Germ. Ital. U.S.A.

Amorpha

Diplodia Amorphae Sacc. Syll. iii. 337. All. vii. 102. Died. 604. Mig. 319. *Sphaeria Amorphae* Wallr. Comp. Germ. no. 3770.

Pycnidia scattered or aggregated in rows, globose, black, up to 500 μ diam., sunk in the bark except that the umbonate vertex slightly raises the epidermis and at length splits it longitudinally; contents black. Spores ellipsoid-oblong, 1-septate, constricted, smoky-brown, 22–25 × 8–10 μ; sporophores linear, about 15 × 1·5 μ.

On small dead shoots of *Amorpha fruticosa*. Kew Gardens. Apr.

Germ. U.S.A. Canada.

Arctostaphylos

Diplodia arbuticola Berk. Outl. 317. Cooke, Handb. 433. Sacc. Syll. iii. 364. All. vii. 104. Mig. 319. *Sphaeria arbuticola* Fr. Syst. Myc. ii. 500.

Pycnidia gregarious, confluent, covered by the blackened epidermis, irregular, black, mouthless, erumpent by the opaque vertex. Spores those typical of the genus.

On dead leaves of *Arctostaphylos* (*Arbutus*) *Uva-Ursi*. Lubcroy, Sutherlandshire (Churchill Babington).

"Very changeable in form, so that one might easily believe that several species were included. On each surface of the leaves and on the branches there protrude from the blackened epidermis black shining shapeless points, which are the pycnidia nestling in the parenchyma and still covered by the epidermis; then they split the epidermis into loose unequal laciniae and become visible, black, opaque, variable, and confluent so as to form long somewhat branched curving lines" (Fr. *l.c.*).

Germ. Swed.

Aucuba

Diplodia Aucubae Westd. in Bull. Acad. Belg. ser. 2, vol. ii, no. 7 (1857). Sacc. Syll. iii. 361; Fung. Ven. ser. 4, no. 8. *D. aucubicola* Sacc. Syll. iii. 344 (on the twigs).

Pycnidia gregarious, immersed, globose-depressed, papillate. Spores oblong-ovoid, for a long time hyaline, then smoky-brown, 1-septate, 25–28 × 12–14 μ.

On dead twigs of *Aucuba japonica*. Edgbaston Botanic Gardens, Birmingham. Mar.

The Edgbaston specimens were accompanied by *Phomopsis aucubicola* Grove on the same twigs. There is no reason why *D. Aucubae* (on the leaves) should be considered as distinct from the Diplodia on the twigs.

Belg. Ital.

Buxus

Diplodia Buxi Fr. Summ. Veg. Scand. 417. Sacc. Syll. iii. 360. All. vii. 108. *Diplodia buxella* Sacc. and *D. buxicola* Sacc. Syll. iii. 349.

Pycnidia usually hypophyllous, densely gregarious, globose-depressed, scarcely papillate, showing through the epidermis which is at length cleft into laciniae in the centre. Spores oblong-ellipsoid, not or scarcely constricted, smoky-brown, $20–24 \times 10–12\mu$.

On dead leaves of *Buxus sempervirens*. Box Hill; etc.

Saccardo's two species, placed above as synonyms, were also both on the twigs of the same bushes; but do not seem to differ from *D. Buxi* in any other respect, except that *D. buxella* is said to have smaller spores ($18 \times 7–8\mu$).

Fr. Germ. Austr. Swed. Ital.

Var. **minor** Grove, in Journ. Bot. 1912, p. 51.

Pycnidia amphigenous. Spores $16–17 \times 7–8\mu$, mixed with some which are ovoid, continuous and smaller.

On half-dead leaves of *Buxus*. Kew Gardens; Sutton Coldfield; Gt. Barr Park, Staffs. Nov.–Jan.

This is *Diplodia inconspicua* Cooke, in Grevill. xiii. 96 (Sacc. Syll. x. 284) = *Microdiplodia inconspicua* All. vii. 82. See the remarks in Journ. Bot. *l.c.*, where it is shown that, in the same pycnidium, spores could be found having any length from 6 to 17 μ combined with almost any breadth from 5 to 9 or 10 μ.

Carpinus

Diplodia Carpini Sacc. in Mich. ii. 266; Syll. iii. 353. All. vii. 112. Died. 606. Mig. 321.

Pycnidia densely gregarious, covered or here and there erumpent, clustered, globose, black, sometimes subdivided within, bluntly papillate, up to 500 μ diam.; peridium of large dark cells, paler within. Spores ovoid-oblong, somewhat in-

equilocular, gently constricted, fuliginous-brown, 18–20 × 7–8 μ; sporophores linear, 15 × 2–2·5 μ. (Fig. 40 *a*.)

On dead branches of *Carpinus Betulus*. Heythrop Park, Oxon. June.

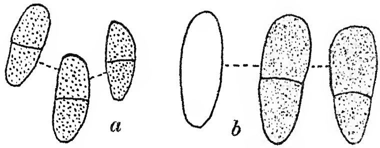

Fig. 40. *Diplodia*: spores of, *a*, *D. Carpini*; *b*, *D. Hederae*, the spore on the left immature; × 600.

The Italian specimens were accompanied by the ascophorous stage, *Cucurbitaria Carpini* Sacc.

Germ. Ital.

Celtis

Diplodia Celtidis Roum. Fung. Gall. no. 19. Sacc. in Mich. ii. 108; Syll. iii. 349. All. vii. 113. Mig. 321.

Pycnidia gregarious, immersed, subglobose, black. Spores rather broad, 1-septate, for a long time remaining hyaline, at length smoky-brown, about 22 × 12 μ; sporophores short.

On bark of branches of *Celtis occidentalis*. Kew Gardens (Cooke), accompanied by a Hendersonia. Apr.

Fr. Austr.

Cercis

Diplodia siliquastri Westd. in Bull. Soc. Roy. Bot. Belg. 1863, ii. 244. Sacc. Syll. iii. 336. All. vii. 114. Died. 607. Mig. 321 (on *Cercis Siliquastrum*). *D. Cercidis* Ell. & Ev. in Proc. Acad. Sci. Phil. 1894, p. 363. Sacc. Syll. xi. 519 (on *Cercis canadensis*).

Pycnidia subseriate, immersed in the bark, globose, 300–500 μ diam., slightly projecting and splitting the epidermis in short longitudinal clefts. Spores ellipsoid or ovoid, smoky-brown, 20–23 × 10–15 μ (18–22 × 8–10 μ, Died.), 1-septate, somewhat constricted; sporophores 10–15 × 1 μ.

On fallen or dead branches of *Cercis canadensis*. Kew Gardens. Recorded in the Tyrol on *Cercis Siliquastrum*.

The small-spored form of this is *Microdiplodia Cercidis* Died. (p. 592) with spores 9–10 × 3–3·5 μ, on sporophores only 3 μ long; it often accompanies the larger form, but has not yet been found in Britain. It is questionable whether the two Diplodias named above are identical.

Belg. Germ. Austr. Ital. U.S.A.

Cistus

Diplodia cistina Cooke, in Grevill. xiv. 4. Sacc. Syll. x. 279. All. vii. 114.

Pycnidia gregarious, deeply seated, covered and concealed by the bark, rather conical, black, often in lines or small clusters, only visible when the outer layers of the bark are peeled off. Spores ellipsoid, not constricted, dark-brown, $16–22 \times 9–10\mu$.

On stems and branches of *Cistus laurifolius* (Cooke). Kew Gardens. Apr.

Cornus

Diplodia mamillana Fr. Summ. Veg. Scand. 417. Sacc. Syll. iii. 344. All. vii. 116. Died. p. 608, p. 552, f. 36. Mig. 322. *D. Corni* Westd. in Cinq. Not. p. 16 (1857).

Pycnidia ± scattered, hemispherical, rather prominent, covered by the adnate blackened epidermis, about 300μ diam., with a papilliform ostiole. Spores ovoid or oblong, constricted, smoky-brown, $20–22 \times 8–10\mu$; sporophores filiform, $6–8 \times 1\mu$.

On bark of twigs of *Cornus sanguinea*. Mickleham; Hadzor Hall, Droitwich, with *Didymella Corni* Sacc. Oct.

With this at Hadzor was a form approaching *Microdiplodia*, otherwise alike, but having spores measuring only $14–18 \times 7–9\mu$.

Europe.

Coronilla

[**Diplodia Genistarum** Cooke, in Grevill. xiii. 96. Sacc. Syll. x. 275. *Microdiplodia Genistarum* All. vii. 84.

"Pycnidia somewhat scattered, immersed in the bark, covered by the epidermis, scarcely visible, globose. Spores ellipsoid, not constricted, rather pale brown, $12–14 \times 6\mu$.

"On twigs of *Genista aetnensis* and *Coronilla Emerus*."] Kew Gardens (Cooke). Apr.

The original specimens of Cooke on *Coronilla* are a Hendersonia and in fact identical with his *H. Coronillae*, *q.v. infra*, p. 75, though I could not find in them any spores larger than $10 \times 6\mu$. What those on Genista were is quite unknown.

Corylus

Diplodia Coryli Fckl. Symb. Myc. 393. Sacc. Syll. iii. 353. All. vii. 117. Died. 609. Mig. 322.

Pycnidia scattered, large, globose, erumpent, black, with

a minute opening and a globose papilliform ostiole. Spores oblong, unequal, olive, then dark-brown, 20–25 × 8–11 μ, at length expelled and staining the epidermis black; sporophores 10 × 2 μ.

On dead branches of *Corylus Avellana*. Barston; Hampstead; etc.

The pycnidial stage of *Otthia Coryli* Fckl.

The large venters of the pycnidia are at last left completely empty. Diedicke found a small-spored form (*Microdiplodia Coryli* Died. in Ann. Mycol. 1913, xi. 46), with spores 9–12 × 3·5–4 μ, in company with his specimens of the Diplodia.

Fr. Germ. Ital. Moravia, U.S.A.

Crataegus

Diplodia Crataegi Westd. Cinq. Not. p. 17, in Bull. Acad. Belg. 1857, and in Kickx, Flor. Crypt. Flandr. i. 393. Sacc. Syll. iii. 340. All. vii. 118. Fckl. Symb. Myc. 393. Died. 609. Mig. 322.

Pycnidia gregarious or arranged more or less in lines, covered, then erumpent, globose, with a conical ostiole, black, up to 250 μ diam. Spores oval-oblong, 1-septate, with the loculi somewhat unequal, blackish-brown, 20–24 × 7–9 μ; sporophores linear-subulate, 10–12 × 2–3 μ.

On dry branches of *Crataegus Oxyacantha*. Kent (Currey). Sussex.

Said to be the pycnidial stage of *Otthia Crataegi* Fckl. Diedicke found it also on the fruits. Cf. *Phoma Crataegi* Sacc.

Belg. Holl. Germ. Ital.

Cytisus

Diplodia rudis Desm. & Kickx, in Rech. cent. IV, p. 27 (1849), mixed with Camarosporium. Sacc. Syll. iii. 337. All. vii. 119. Died. 610. Mig. 322. *Diplodia Cytisi* Auersw. *apud* Fckl. Symb. Myc. 175 (1869). See also *D. nigricans*, *infra*, and cf. *D. Auerswaldii* Bäuml. *apud* Sacc. Syll. xviii. 320; these are all probably the same species.

Pycnidia gregarious, very convex, bullate, black, up to 500 μ broad, often becoming connate, seated on a wide-spread flat blackish subiculum which is concealed beneath the bark, at length emerging by a slit; peridium thick, dark-brown, pierced by a pore. Spores oblong-ovoid, for a long time pale or pale-fuscous, continuous and often biguttulate, then becoming brown and 1-septate, but not or scarcely constricted, 25–33 × 10–11 μ.

On dead branchlets of *Cytisus Laburnum*. Common: Worcs.; Warwicks.; Cambs.; Glos.; Scotland; etc. Associated with *Cucurbitaria Laburni* wherever that occurs.

The subiculum is composed of entangled brown hyphae, 4–6 μ wide, much branched, septate and knotted; the surface of the wood underneath the subiculum is stained black. It seems by no means questionable that this Diplodia is closely connected with *Camarosporium Laburni*, for one can see transition stages, e.g. the formation of a second transverse septum, in one of a number of Diplodia spores growing in a cluster. See an article by Miss Green in T.B.M.S. 1932, xvi. 289–303, in which she describes other spore-forms which do not appear to belong to the Diplodia-Camarosporium complex. But Miss Green would have been able to reason more understandingly of these forms if she had had more experience of their occurrence in the field.

S.W. Europe, U.S.A.

· **Diplodia nigricans** Sacc. in Mich. ii. 269; Syll. iii. 337. All. vii. 119.

Pycnidia densely scattered, immersed, then erumpent and surrounded by the torn epidermis, subglobose, with an inconspicuous very black papilla. Spores at first hyaline, oval-oblong, then yellow, continuous, at length 1-septate, hardly constricted, dusky-olive, at last almost opaque, 18–25 × 7–10 μ; sporophores stout, as long as or longer than the spore.

On branches of young *Cytisus nigricans* (*Laburnum alpinum*). West Kilbride, Ayrshire (Boyd).

What is the exact relation of *D. nigricans* to *D. Cytisi* Auersw. is uncertain.

Ital. Spain.

Elaeagnus

Diplodia Elaeagni Passer. Micr. Ital. no. 15. Sacc. Syll. iii. 348. All. vii. 120. *D. elaeagnella* Tassi, in Rev. Mycol. 1896, p. 166. Sacc. Syll. xiv. 935. All. vii. 120, with fig. Died. 611. Mig. p. 323, pl. 40, f. 18–20.

Pycnidia densely gregarious, covered, then erumpent, globose, depressed, pierced by a pore, up to 600 μ broad, surrounded by the laciniae of the bark. Spores oblong, at length 1-septate, not constricted, often biguttulate, fuliginous, 18–23 × 8–10 μ; sporophores linear, hyaline, 8–14 × 2 μ.

On twigs of *Elaeagnus angustifolius*. Kew Gardens, in company with a Hendersonia.

The Diplodia is not a mere state of the Hendersonia; it is true that the Hendersonia is at first eseptate, then 1-septate, before becoming 3-septate, but it does not have the stout persistent pedicels of the Diplodia, besides other differences. Tassi's form (on the twigs) seems not to be different from Passerini's (on the leaves), except in the slightly shorter spores.

Germ. Ital.

Euonymus

Diplodia ramulicola Desm. in Ann. Sci. Nat. 1850, xiv. 113. Sacc. Syll. iii. 333. All. vii. 122. Died. 611. Mig. 323. *Diplodia Euonymi* Fckl. Symb. Myc. 395. *D. Euonymi* Westd. no. 930 (on the leaves). Sacc. Syll. iii. 360.

Pycnidia numerous, densely scattered, covered by the epidermis, rather prominent, black, opaque, 250–300μ diam.; ostiole papillate; contents at first whitish, gelatinous. Spores ellipsoid, almost hyaline or faintly brownish, thick-walled, at length subclavate, ± constricted, smoky-brown, 24–30 × 10–12μ; sporophores about 10–15 × 2μ.

On dead branches and leaves of *Euonymus europaeus*, *E. japonicus*. Polperro, etc., Cornwall (Rilstone).

The French specimens examined (Desm. no. 1879; Roum. no. 13) were in both cases accompanied by *Phomopsis ramealis* Died. There seems to be no reason, except habit of mind, why anyone should consider *D. Euonymi* Westd., on the *leaves* of *Euonymus*, as a distinct species.

Fr. Belg. Holl. Germ. Austr. Ital. U.S.A.

Fagus

Diplodia faginea Fr. Summ. Veg. Scand. 417. Sacc. Syll. iii. 354. All. vii. 122. Died. 612. Mig. 324.

"Pycnidia immersed, gregarious, globose, black; ostiole papillate, erumpent. Spores ellipsoid, gently constricted, smoky-brown, 24 × 12μ."

On bark of branches of *Fagus silvatica*. Reported as British. *n.v.*

Saccardo suggests that it is a pycnidial stage of his *Massaria macrospora*; see *Scolecosporium Fagi* Lib. *infra*, p. 340.

Fr. Holl. Germ. Ital. Swed.

Ficus

Diplodia sycina Mont. in Cast. Suppl. 64. Sacc. Syll. iii. 350. All. vii. 123. Mig. 324.

Pycnidia erumpent in lines from the cracks of the exposed

wood, globose, rather compressed, opaque, black. Spores oblong, fuscous-brown, $16–23 \times 10\mu$; sporophores very short.

On dead branches of *Ficus Carica*. King's Cliffe, Norths. (Berk.).

Var. **syconophila** Sacc. *l.c.*

Pycnidia densely aggregated, immersed in the bark, globose, papillate, black. Spores constricted at the septum, fuliginous, $20–25 \times 8–11\mu$.

On branches of *Ficus Carica*. Kidderminster.

There is also a var. *carpophila*, found in Italy on the dry shrivelled hanging fruits, with solitary pycnidia.

Fr. Germ. Austr. Ital. India.

Fraxinus

Diplodia inquinans Westd. Not. II, p. 14. Sacc. Syll. iii. 346. All. vii. 124. Died. p. 612, p. 552, f. 35. Mig. 324. *Phoma hyalina* Sacc. Syll. iii. 88, *p.p.* *Macrophoma Fraxini* Delacr. in Bull. Soc. Myc. Fr. 1890, p. 140.

Pycnidia for the most part densely gregarious, covered, then elevating and splitting the epidermis, subglobose, thick-walled, sometimes pseudolocellate within, with an evident pore; peridium externally dark-brown or black, parenchymatous, paler within. Spores oblong-ellipsoid, obtusely rounded above, sometimes narrowed below, straight or gently curved, sometimes inequilateral, for a long time one-celled and nearly colourless, then 1-septate, slightly constricted, dark-brown, with large oil-guttules, $20–25 \times 12–14\mu$; sporophores filiform or oblong, about $15 \times 2\mu$.

On dry branches of *Fraxinus excelsior*. London; Kew; Warwicks.; Worcs.; Newcastle-on-Tyne; Ayrshire; etc.

Feb.–Apr.

Pycnidia standing singly, and with all possible states between that and *Botryodiplodia Fraxini*, may also be seen. See Vol. I, p. 126, and *Discula macrosperma*, *infra*, p. 127.

Europe, N. Amer.

Hedera

Diplodia Hederae Fckl. Symb. Myc. p. 394, pl. 2, f. 35. Sacc. Syll. iii. 344. Grove, in Journ. Bot. 1886, p. 135. All. vii. 126. Died. 614. Mig. 325. *Diplodia hedericola* Speg. Arg. Pug. II, no. 130. *Sphaeropsis hedericola* Sacc. Syll. iii. 295.

Pycnidia scattered or collected in small groups, roundish or elliptical, erumpent, black, 300–500 μ diam.; texture parenchymatous, blackish, almost opaque; ostiole conical, piercing the epidermis which is longitudinally rimose and sometimes blackened. Spores oblong, rounded at each end, with one or two guttules, at length 1-septate, the septum often arcuate and dividing the spore unequally, at last becoming dusky-olive, 24–30 $\times$ 10 μ. (Fig. 40*b*.)

On shoots and leaves of *Hedera Helix*. King's Norton; Scarborough; Edinburgh; etc. Rather uncommon. Jul. Aug.

Externally resembling *Coniothyrium Hederae* Desm. The spores ooze out and form, at the ostiole, a globule which is white when they are hyaline and immature, but afterwards brown. See also *Microdiplodia hedericola*, *supra*, p. 26.

Fr. Belg. Holl. Germ. Ital. N. & S. America.

Humulus

Diplodia Humuli Fckl. Symb. Myc. 393. Sacc. Syll. iii. 365. All. vii. 127. Died. 615. Mig. 325.

"Pycnidia caespitose or solitary, erumpent, globose, attenuated into a short cylindrical beak, rugulose, black. Spores oblong, symmetrical, gently constricted, smoky-black, 22 $\times$ 12 μ."

On dead stems of *Humulus Lupulus*. Reported as British. *n.v.*

Fr. Germ. Canada.

Ilex

Diplodia ilicicola Desm. in Ann. Sci. Nat. 1838, x. 311. Berk. in Ann. Nat. Hist. 1841, vi. 365, pl. 11, f. 7. Cooke, Handb. 432. Sacc. Syll. iii. 333. All. vii. 128. Died. 615. Mig. 325. *D. Ilicis* Fr. Summ. Veg. Scand. 417 (1846). Cooke, Handb. 434. Sacc. Syll. iii. 360.

Pycnidia gregarious, covered, but showing through the epidermis, globose, with a papillate erumpent ostiole. Spores cylindric-oblong, rounded at the apex, not or gently constricted, often biguttulate, smoky-brown, 20–25 $\times$ 9–10 μ; sporophores hyaline.

On dead twigs and leaves of *Ilex Aquifolium*. Not uncommon; England, Ireland (Ulster). Mar. Apr.

The form on the leaves (*D. Ilicis* Fr.) seems not to differ from that on the twigs (*D. ilicicola* Desm.), except that its spores are said to

measure as much as 12–14μ in breadth, but this is certainly not always true. The leaf-spores are at first without a septum, and in this state it is *Macroplodia aquifolia* Westd. in Cinq. Not. p. 19, f. 7 (1857) = *Sphaeropsis aquifolia* Sacc. Syll. iii. 295. Cf. also *Camarosporium Ilicis* Oud. p. 97.

Europe, N. America.

Jasminum

· **Diplodia Jasmini** Westd. Cinq. Not. p. 17, in Bull. Acad. Belg. 1857. Sacc. Syll. iii. 346. All. vii. 129.

Pycnidia congregated, mostly in little groups of 2–5 or more, globose-papillate, covered by the epidermis, splitting it and then surrounded by it, black. Spores oblong, for a long time hyaline and continuous, then 1-septate, gently constricted, brown, 24–28 × 10–12μ (fuliginous, 30 × 15μ, Sacc.); sporophores stout, about half as long.

On dead stems of *Jasminum officinale*. Hadzor Hall, near Droitwich (Rhodes & Grove). Feb. Mar.

Forma **sparsa** Grove, *pycnidiis sparsis*.

Pycnidia always separate, scattered, up to 300μ diam., for a long time covered by the whitish epidermis; texture rather thin. Spores hyaline, then 1-septate and brown, 19–20 × 8μ; sporophores about as long.

On dead twigs of *Jasminum nudiflorum*. Abbot's Salford, Warwickshire (Rhodes). Nov.

Fr. Belg. Germ. Ital.

Juglans

· **Diplodia Juglandis** Fr. Summ. Veg. Scand. 417. Sacc. Syll. iii. 352. All. vii. 130. Died. 615. Mig. 326. *Sphaeria eructans* Wallr. Flor. Crypt. 781. *D. juglandina* Otth, in Bern. Mitth. 1868, p. 59. Sacc. Syll. xi. 521. *D. nucis* Brun. Sphaerops. nouv. in Bull. Soc. Bot. Fr. 1893, xl. 224.

Pycnidia ± gregarious, globose-depressed, immersed, then erumpent, smooth, black, up to 500μ diam., pierced by a pore; wall thick and firm; contents grey. Spores ovoid-oblong, constricted (sometimes deeply) in the middle, smoky-brown, 20–25 × 10–12μ; sporophores about 10 × 2μ.

On bark of branches of *Juglans regia*. Apethorpe (Berk.).

According to Fuckel it is the pycnidial stage of his *Cucurbitaria Juglandis*. The small-spored form, *Microdiplodia Juglandis* Died., which occurs with it in Germany and has spores 10–13 × 4μ, on very

short sporophores, has not yet been found in Britain, nor has Brunaud's variety that grows on the fruits.

Europe.

Juniperus

· **Diplodia Juniperi** Westd. Cinq. Not. p. 17, in Bull. Acad. Roy. Belg. ser. 2, vol. ii, no. 7 (1857). Sacc. Syll. iii. 355. All. vii. 131. Died. p. 616, p. 552, f. 37. Mig. 326.

Pycnidia scattered, solitary, up to 400μ diam., immersed, at length piercing the epidermis by the brown papillate ostiole. Spores ovoid-oblong, not constricted, fuscous-brown, then darker, 18–20 × 8–10μ; sporophores subulate, about half as long.

On twigs and branches of *Juniperus communis*. Stratford-on-Avon (Vize).

A variety with slightly larger spores (24–26 × 10–11μ) has been found on the leaves in France. I was unable to find this fungus on the Stratford-on-Avon specimens examined, only *Pestalotia funerea*.

Western Europe.

Kerria

Diplodia Kerriae "Berk." in Kickx, Flor. Crypt. Flandr. i. 399. Sacc. Syll. iii. 339. All. vii. 131. Died. p. 616, p. 552, f. 38. Mig. 326.

Pycnidia scattered or subgregarious, covered by the raised epidermis, globose, nearly mouthless, black, about 300μ diam. Spores oblong-ellipsoid, rounded at both ends, constricted, smoky-brown, 20–25 × 7–9μ; sporophores shorter, 1·5μ thick.

On dry branches of *Kerria japonica*. No certain British locality known.

Fr. Belg. Holl. Germ. Ital. U.S.A.

Laurus

Diplodia laurina Sacc. Myc. Ven. no. 508; Syll. iii. 348. All. vii. 132. *D. melaena* var. *Lauri* Roum. Fung. Gall. no. 121.

Pycnidia scattered or aggregated, immersed in the cortex, black, 200–300μ diam. Spores oblong or slightly obovoid, hardly constricted, at first rust-brown and eseptate, afterwards dark smoky-brown, varying in size, 18–25 × 7–9μ (29 × 9μ, Sacc.; 18–22 × 9–11μ, Petrak; 20–34 × 9–10μ, Wakefield).

On dead twigs of *Laurus nobilis*. Kew Gardens; Arundel Park. May.

Passerini's var. *minor* (spores $18–20 \times 10–12\,\mu$) does not differ in any way from the British specimens. See Sacc. Syll. x. 279, and Journ. Hist. Nat. Bord. 136.

Fr. Austr. Ital.

Ligustrum

Diplodia Ligustri Westd. in Bull. Soc. Roy. Belg. ii. 244 (1863). Sacc. Syll. iii. 347. All. vii. 133. Died. 617. Mig. 327. *Diplodia Mamma* Fckl. Symb. Myc. 394 (1869).

Pycnidia gregarious, immersed, then erumpent by the papilla, globose, $400–450\,\mu$ diam.; wall thin at first, then thicker, brown outside, paler within; contents at first colourless, then brown. Spores oblong-ellipsoid, for a long time hyaline and granular-guttulate, at length smoky-brown and 1-septate, gently constricted, $20–26 \times 8–10\,\mu$; sporophores shorter than the spore, $2–3\,\mu$ thick.

On thin dead twigs of *Ligustrum vulgare*. Kew Gardens; Highgate; Darenth; Forden; Scarborough; Mickleham; Hanbury and Hadzor, Ws.; etc. Apr.–Jun.

A variety, with broader spores, $22 \times 15\,\mu$ and not constricted, is recorded from France on *L. ovalifolium*.

Fr. Belg. Holl. Germ. Ital.

Liriodendron

Diplodia tulipiferae Died. in Ann. Mycol. iv. 414; Pilz. Brand. 617. Mig. 327.

Pycnidia scattered or arranged in lines, covered, then bursting the epidermis but not projecting above it, oblong or depressed-globose, very thick-walled with even the inner layer olive-coloured, pierced by a round pore, $250–300\,\mu$ diam. Spores clear- then dusky-brown, 1-septate, more or less constricted, $20–24 \times 8–10\,\mu$, some shorter and broader, and then more deeply constricted so that their loculi seem almost globular; sporophores subulate, $6–9 \times 1{\cdot}5\,\mu$.

On dead twigs and branches of *Liriodendron tulipifera*. Heythrop Park, Oxon. (Grove & Rhodes). Polperro (Rilstone & Rhodes). Jun. Jul.

It was also found, on dead twigs, in March, in the immature *Macrophoma* state.

Germ.

Lonicera

Diplodia Lonicerae Fckl. Symb. Myc. 141. Sacc. Syll. iii. 345. All. vii. 134. Died. p. 618, p. 552, f. 39. Mig. 327.

Pycnidia rather large, up to 1 mm. diam., arranged in elongated erumpent clusters, globose, papillate, black, very delicately punctate (?). Spores oblong, scarcely constricted, blackish-brown, $20–32 \times 9–10\mu$ or $25–30 \times 10–12\mu$; sporophores slender, $10–15 \times 1–1{\cdot}5\mu$.

On dead branches of *Lonicera Caprifolium*. Kew Gardens; Sheen. Feb.–Apr.

The British specimens are not in clusters, but somewhat seriate, and the spores and pycnidia are rather smaller. The "pseudoparaphyses" which Diedicke talks about (*l.c.*) are sporophores that have grown longer after having lost their spores.

Fr. Holl. Germ. Ital. N. Amer.

Magnolia

Diplodia Magnoliae Westd. in Bull. Acad. Belg. ser. 2, vol. ii, no. 7 (1857). Sacc. Syll. iii. 363. All. vii. 134. *D. Ravenelii* Cooke, in Grevill. vii. 44 (1878). Sacc. Syll. iii. 363.

Pycnidia scattered or in loose groups all over the upper side of the leaf and more densely on the mid-rib, also on the stems, black, very convex, up to 550μ diam., papillate, dull, not shining, faintly rugulose, immersed, then bursting the epidermis and surrounded by its laciniae. Spores oval, 1-septate, not constricted, brown, $18–22 \times 8–11\mu$; sporophores short.

On leaves and stems of *Magnolia grandiflora*. Kew Gardens (Cooke). Hadzor Hall, Droitwich (Rhodes). Feb. Mar.

There is no reason why Cooke's *Diplodia punctipetiola* (Sacc. Syll. iii. 363) or *D. magnoliicola* Brun. (Sacc. Syll. xi. 518) should be considered as different from this species. Cf. *supra*, p. 28.

Belg. Ital. U.S.A.

Menispermum

Diplodia sarmentorum Fr. Summ. Veg. Scand. 417. Sacc. Syll. iii. 365. All. vii. 137. Died. 620. Mig. 329. *D. menispermi* Ell. & Barth. no. 1269.

Pycnidia scattered, hemispherical, prominent, smooth, shining; contents black; ostiole somewhat prominent, but most often torn away. Spores ovoid-oblong, at first hyaline, then coloured, at length 1-septate and smoky-brown, scarcely constricted, $25–30 \times 9–12\mu$ (up to 14μ, Sacc.); sporophores hyaline, short.

On branches of *Menispermum canadense*. Kew Gardens. Apparently, wherever the host is cultivated.

"Pycnidia always covered, but very prominent and, when the epidermis is removed, the upper half sticks to it; not collapsing" (Sacc.).

Fr. Germ. Ital. Swed. (in gardens), U.S.A., Canada.

Morus

Diplodia Mori Westd. in Bull. Soc. Bot. Belg. ii. 244. Sacc. Syll. iii. 351. All. vii. 138. Died. 621. Mig. 329.

Pycnidia gregarious or densely crowded, immersed, then erumpent and rather prominent, globose, papillate, 300–350 μ diam., black; walls rather thick. Spores ellipsoid-oblong, gently constricted, smoky-brown, $20–25 \times 9–10\mu$; sporophores colourless, $8–10 \times 1{\cdot}5\mu$.

On bark of branches of *Morus* (*alba, nigra, rubra*), Kew Gardens. Apr. May.

The pycnidial stage of *Cucurbitaria moricola* Sacc.

In Germany the usual small-spored form, *Microdiplodia Mori* All. vii. 89 (Sacc. Syll. xviii. 328) is found in company with it on the smaller twigs, with spores measuring $10–12 \times 4–5\mu$. Also on the thicker branches a more caespitose form occurs with broader spores, forming a transition to Botryodiplodia. According to Saccardo, *Diplodia Mori* Berk. is not a Diplodia.

South Europe, Algeria, N. America, India.

Palmae

Diplodia Coryphae Cooke, in Grevill. xiii. 96. Sacc. Syll. x. 291. All. vii. 140.

Pycnidia immersed, covered, erumpent, cracking the epidermis in linear longitudinal fissures, very small, black. Spores subglobose or oval, not at all constricted, with a thin epispore, pale smoky-brown, $12–15 \times 7–9\mu$.

On petioles of Fan Palms (*Corypha*). Kew Gardens. Apr.

Cooke gave the size of the spores as $14–17 \times 10\mu$ (*l.c.*).

Paulownia

Diplodia Paulowniae Cooke, in Grevill. xiii. 96. Sacc. Syll. x. 282. All. vii. 141.

Pycnidia somewhat scattered, at length erumpent, but not superficial, subglobose, black. Spores ellipsoid, scarcely constricted, clear-brown, $20–22 \times 8\mu$.

On twigs of *Paulownia imperialis*. Kew Gardens. Apr.

"Mixed with a Pleospora and a Phoma." (Cooke.)

Pinus

Diplodia Pinastri Grove, in Journ. Bot. 1916, p. 193. *Phoma Pinastri* Lév. in Ann. Sci. Nat. 1846, v. 282. Grevillea, iii. 178. *Sphaeropsis Pinastri* Sacc. Syll. iii. 300. Grevillea xiv. 36. *S. micromegala* B. & C. North Amer. Fung. no. 410 *bis*, in Grevill. ii. 180 (1874). *S. Ellisii* Sacc. Syll. iii. 300. All. vii. 7. Died. p. 581, p. 552, f. 17. Mig. 463. *Diplodia conigena* Desm. in Ann. Sci. Nat. 1846, vi. 69. Sacc. Syll. iii. 359. All. vii. 98. Mig. 318.

Pycnidia gregarious, immersed, globose, black without and within, almost concealed by the torn epidermis; ostiole pierced by a pore. Spores ovoid-oblong, at first colourless, then olivaceous-brown, at length dark-brown and nearly opaque, for a long time continuous and often furnished with one large guttule, ultimately 1-septate, $30–40 \times 14–16\,\mu$ ($20–30 \times 7–12\,\mu$ when somewhat less mature, or even smaller still).

On bark, leaves, and cone-scales (chiefly on the apophysis) of *Pinus silvestris*. Rather common in the British Isles.

Mar.–Nov.

The size of the spores given by Saccardo for his *Sphaeropsis Pinastri* ($10 \times 6–7\,\mu$) is copied by him from Cooke's erroneous statement, in Grevill. iii. 178, about the spores of *Phoma Pinastri* Lév. But really the British (Eastbourne) specimens of that species, the French specimens of Desmazières (both quoted by Saccardo), and the German specimens of Rabenhorst, all have the mature spores of the size given in my description above, and not as Cooke stated. These spores remain for a long time without a septum and often without any colour also. Hence they were at first wrongly called Phoma or Sphaeropsis.

The form of this species on the cones is frequently thickly clustered on the apophysis, the forms on the bark and leaves are more scattered but otherwise the same. Desmazières gives the size of the spores of his *D. conigena* as $28–33 \times 16\,\mu$, and adds "cloisons rares". *S. micromegala* B. & C. is a compressed form found in America on decorticated wood of the roots of Pine.

There is a variety on cones of *Abies*, found in France and Germany (*S. Ellisii* var. *Abietis* Fautr. in Rev. Mycol. 1897, p. 55; Sacc. Syll. xiv. 922), which is also referred to by Desmazières (*l.c.*), but it does not differ in any essential point from the typical form. It should be noticed that the name *S. Ellisii* was given by Saccardo to the American specimens of Cooke and Ellis because of his mistaken idea of the size of the spores in *S. Pinastri*. *D. pinea* Kickx and *D. sapinea* Fckl. (*vide infra*) are both probably mere forms of *D. Pinastri*.

Europe, U.S.A.

· **Diplodia pinea** Kickx, Flor. Crypt. Flandr. i. 397 (1867). Sacc. Syll. iii. 359. All. vii. 144. Massee, Dis. Cult. Pl. 574. Bancroft, in Kew Bull. 1911, p. 60. T.B.M.S. v. 245. *Sphaeria pinea* Desm. in Ann. Sci. Nat. 1842, xvii. 104. *Sphaeropsis pinea* B. & Br. in Ann. Nat. Hist. 1865, xv. 401.

Pycnidia on the shoots and leaves, minute, subglobose, black, erumpent, ± gregarious, on the bark often arranged in sinuous rows, more scattered on the leaves; ostiole papillate, projecting, at length deciduous. Spores oblong or ellipsoid, at first continuous and yellowish, later becoming 1-septate and smoky-brown, but hardly constricted, 35–45 × 16–20 μ (but often narrower); sporophores short.

On leaves and young branches of *Pinus* (*silvestris*, *montana*, etc.). South of England, rather common. See Board of Agric. Leaflet no. 199. Oct.

A serious pest: the attacked leaves fall prematurely. It appears not to be able to spread to *Abies*; but there seems to be little reason why this species should not be considered a form of the preceding.

Europe, Australia, Cape Colony.

Diplodia sapinea Fckl. Symb. Myc. 393. Sacc. Syll. iii. 356. All. vii. 97. Died. 601. Mig. 318. *Sphaeria sapinea* Fr. Syst. Myc. ii. 491.

Pycnidia gregarious, crowded, erumpent, globose, smooth, fuscous-black, 300–400 μ diam.; ostiole papilliform, rather prominent. Spores ellipsoid-oblong, sometimes inequilateral, constricted, smoky-brown, 20–26 × 12 μ, but sometimes larger; sporophores indistinct.

On bark of branches of *Pinus silvestris*. Near King's Lynn (Plowright). Yorkshire. Aug.

Plowright remarks (in Grevill. iii. 124) that the septum is frequently wanting, and on examining his specimens I found that that is so; except for the slight difference in shape, the spores might have been referred to *D. Pinastri*. This species is also recorded on *Abies*, *Picea*, and *Araucaria*.

Fr. Denm. Germ. Ital. Spain, Swed.

Platanus

Diplodia paupercula B. & Br. North Amer. Fung. no. 419 *bis*, in Grevill. 1874, iii. 2. Cooke, Handb. 432. Var. **Platani** Sacc. Syll. iii. 345.

Cf. B. & Br. in Ann. Nat. Hist. 1850, v. 371; cf. also *Dipl. platanicola* Sacc. Syll. xxii. 992.

Pycnidia covered, then free, globose, with a prominent ostiole. Spores small, at first ellipsoid or obovoid, hyaline, then oblong, brownish and 1-septate ($16–20 \times 8–11 \mu$, in *D. platanicola*).

On dead twigs of *Platanus*. Batheaston (Broome). *n.v.*

"Resembling *Phoma notha* and *P. Radula*. Pycnidia one or two together, concealed, then exposed, globose, with a rather prominent orifice. *P. notha* is distinguished by its spurious imperfect somewhat irregular pycnidia" (B. & Br.). But these Phomas, cited by B. & Br., belong to Phomopsis. *D. paupercula* itself, on *Lonicera*, has spores $10 \times 5 \mu$.

Fr. Germ. Ital.

Populus

Diplodia mutila Fr. & Mont. in Ann. Sci. Nat. 1834, i. 302. Cooke, Handb. 431. Sacc. Syll. iii. 353. All. vii. 147. Died. 624. Mig. 332. *Sphaeria mutila* Fr. Syst. Myc. ii. 424. *Sphaeria* (*Diplodia*) *mutila* Fr. & Mont. in Ann. Sci. Nat. *l.c.*

Pycnidia in groups or confluent, globose, black, the prominent upper part unequal and rugose; ostiole simple. Spores ellipsoid, rounded at both ends, smoky-brown, $20–24 \times 7–9 \mu$; sporophores short.

On bark of dead branches and twigs of *Populus*. Kent; Shrewsbury; Bromsgrove Lickey, Worcestershire; etc.

Dec.–Feb.

The pycnidia are often arranged in rows, and may become confluent, but there is little if any stroma. Fries himself recognised that his fungus was a Diplodia, and informed Berkeley to that effect; see Ann. Nat. Hist. 1850, v. 372, and Stevens, in Mycologia, 1933, p. 546.

Fr. Belg. Holl. Germ. Ital. Swed.

Diplodia populina Fckl. Symb. Myc. 170. Sacc. Syll. iii. 353. All. vii. 147. Died. 624. Mig. 332.

Pycnidia gregarious, covered, at length bursting through the cleft epidermis, rather large, flattened, papillate. Spores oblong or ovoid, varying in size, about $23–25 \times 12–13 \mu$ on the average.

On branches of *Populus nigra*. Recorded for Britain. *n.v.*

The pycnidial stage of *Otthia populina* Fckl. It is said to differ from *D. mutila* only in the non-constricted spores.

Holl. Germ. Austr. Ital. Port.

Prunus

Diplodia tecta B. & Br. in Ann. Nat. Hist. 1850, v. 372. Cooke, Handb. 433. Sacc. Syll. iii. 363. All. vii. 150. *D. consors* B. & Br. *l.c.* p. 373 (a younger state). *D. Laurocerasi* Westd. Bull. Acad. Belg. ser. 2, vol. ii, no. 7.

Pycnidia gregarious, covered, elevating the epidermis, which is often blackened and shining; ostiole at first concealed, then bursting out in the centre with a whitish orifice. Spores oblong, for a long time continuous, at length 1-septate, gently constricted, 20–25 × 10–14 μ when mature and dark-brown.

On dead leaves and branches of *Prunus Laurocerasus*, *P. lusitanica*. Kew Gardens; Suffolk; King's Cliffe; Hadzor Hall; Forden; Glamis; etc. Nov.

"The leaves are rough with little elevated pustules, disposed often in dry discoloured patches, and marked each in the centre with a shining black speck" (B. & Br.). In the Kew Gardens specimen the mature spores are very abundant, and are nearly opaque.

Fr. Ital.

Diplodia Roumegueri Sacc. in Mich. ii. 106; Syll. iii. 340. All. vii. 148. *D. laurina* Roum. Fung. Gall. no. 217 (*non* Sacc.).

Pycnidia gregarious, immersed, then erumpent, globose, papillate, black. Spores oblong, at first colourless, soon becoming yellow, then 1-septate, distinctly constricted, at length smoky-brown, and finally semi-opaque, 20–25 × 8–12 μ; sporophores short.

On dead branches of *Prunus Laurocerasus*, *P. lusitanica*. Kew Gardens (Cooke). Studley Castle, Warwickshire. June.

Spores for a long time without a septum, mostly rather smaller than the size given by Saccardo (25 × 13 μ). Brunaud records a variety *santonensis* (Sacc. Syll. xi. 518), in which the non-constricted spores reach as much as 30 × 15–18 μ. But the separation of this species *Roumegueri* (a *branch*-form) from *D. tecta* (a *leaf*-form originally) is based upon the false idea of the older mycologists; they are the same species, and should be united.

Fr. Holl. Ital.

Diplodia Padi Brun. in Rev. Mycol. 1882, iv. 226. Sacc. Syll. iii. 340. All. vii. 148. Died. 626. Mig. 333. See Scot. Nat. 1887, p. 185.

Pycnidia scattered or gregarious, occasionally confluent, covered, then raising the epidermis and bursting it, provided

with thick walls, up to 600μ diam. Spores oblong-clavate, 1-septate, somewhat constricted, fuscous-brown, $22–25 \times 8–10\mu$, the upper loculus shorter and broader than the lower one; sporophores $10 \times 1–1·5\mu$.

On dry twigs of *Prunus Padus*, Forres, Moray (Keith).

There is also a form with smaller spores, $12–15 \times 5–7\mu$, found in France in company with the Diplodia; this is probably a Microdiplodia.

Fr. Germ.

Pyrus

Diplodia malorum Fckl. Symb. Myc. 395. Sacc. Syll. iii. 363. All. vii. 145. Died. 623. Mig. 330. *Sphaeria malorum* Berk. in English Flor. v. 257 (1836). *Sphaeropsis malorum* Berk. Outl. p. 316 (1860). ? Peck, in Ann. Rep. N.Y. State Mus. 1881, p. 36, pl. 4, f. 16–21. Sacc. Syll. iii. 294. *Phoma malorum* Sacc. Syll. iii. 152. *Macrophoma malorum* Berl. & Vogl. in Syll. Addit. 310. *Diplodia pseudodiplodia* Fckl. Symb. Myc. 393. Sacc. Syll. iii. 341. Died. p. 623, p. 552, f. 40. Mig. p. 330, pl. 42, f. 5, 6. *D. maura* Cooke & Ellis, in Grevill. vi. 85.

Pycnidia gregarious or collected into groups, at first covered by the epidermis or periderm which is convexly raised, then bursting it and becoming free, globose, up to 400μ diam., papillate, black; peridium of several layers thick,

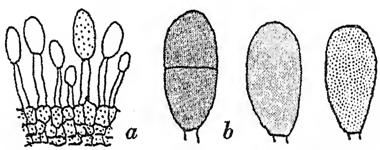

Fig. 41. *Diplodia malorum*: *a*, young spores, *in situ*, $\times 300$; *b*, *D. malorum*, *f. Mespili*, three spores of different ages, $\times 600$.

paler inwards. Spores oblong-ellipsoid, at first and for a very long time colourless, $20–30\mu$ long, irregular, granular within, then dark smoky-brown, at length 1-septate, scarcely constricted, $22–25(–28) \times 10–14\mu$; sporophores oblong; spores exuding at various ages in the form of whitish or pallid or (much more rarely) blackish-brown masses. (Fig. 41.)

On branches of *Pyrus Malus*, *P. communis*, and on the fruits. South of England, but not common. Also on *Mespilus germanica*, Hadzor Hall, Ws.

Rarely seen with septate spores.

Sphaeropsis malorum Peck is a serious pest of Apple, Pear, and Quince in the United States, and has been reported as occurring in this country. It produces numerous round purple, then rusty-brown, spots on the leaves, but usually no spores until the leaves have fallen; it can attack also the branches, twigs, and fruit.

It was formerly said that *D. malorum* grew on the fruits, *D. pseudo-diplodia* on the dead or dying or still living branches of its hosts; but there is no such difference in fact. Berkeley's *Sphaeria malorum* included only the pycnidial stage, as is evident on reading his words in the English Flora. What he there calls "septate asci, filled with yellowish-green granules" are the immature pycnospores just as they are to be seen to-day.

Neil Stevens, in Mycologia, 1933, xxv. 536–548, maintains that *Sphaeropsis malorum* Berk. and *Sphaeropsis malorum* Peck are two distinct fungi. That may be so; he is the best judge, though both appear to occur in this country. But when he goes on to assert that Berkeley's fungus is the same as *Diplodia mutila* (Fr.) Mont. which lives on *Populus*, he stands on a different basis. Berkeley found the specimens to which he gave the name *Sphaeria malorum* "on apples lying on the ground" (p. 257), and he repeated this statement, in another form "on decaying apples", when he changed the name to *Sphaeropsis malorum* (Outl. p. 316). If we are asked to believe that this Diplodia is identical with one growing on *Populus*, our faith is violently strained, because such a change of habitat is contrary to our experience in this country. The writer of the article in Mycologia can easily acquiesce in this theory, because he holds the very improbable belief that his particular fungus can flourish on no fewer than seventy-two distinct genera. For a similar thesis about the tropical *Botryodiplodia Theobromae*, see Petch in Ann. Roy. Bot. Perad. 1910, iv. 459–460.

Europe, N. America, Australia, New Zealand.

Diplodia Griffoni Sacc. & Trav. in Syll. xx. 1228 (1911) and xxii. 994. Alcock, in T.B.M.S. viii. 190. *Diplodia* sp. Griffon & Maublanc, in Bull. Soc. Myc. Fr. 1910, xxvi. 314, pl. 13, 14.

Pycnidia rather large, scattered or in groups, globose-depressed, surrounded by a quantity of purplish mycelium. Spores elliptic-oblong, somewhat irregular, granular within, for a long time remaining hyaline, thick-walled, $20–30 \times 10–13\mu$, at length becoming $\pm$ ovoid, 1-septate, fuliginous, $22–25 \times 10–14\mu$.

Parasitic on bark of *Pyrus Malus*, Sussex, etc.

D. Griffoni is supposed to be a more actively parasitic pest than *D. malorum*, of which it is a close ally or (preferably) a mere form.

The position of the two with regard to one another reminds one of the relation of *Phomopsis perniciosa* to the as yet unidentified Phomopsis of which *P. perniciosa* is a more virulent offshoot. See Vol. I, pp. 214–15.

Fr. New Zealand.

Quercus

Diplodia Quercus Fckl. Symb. Myc. 170. Sacc. Syll. iii. 354. All. vii. 151. Died. 626. Mig. 333. *D. cincta* Fckl. Symb. Myc. 395. Sacc. Syll. iii. 355. Mig. 333.

Pycnidia widely gregarious, occasionally clustered, 500μ or more diam., immersed, raising the epidermis convexly, then erumpent by splitting and at length throwing it off, hemispherical, rugulose, 500μ diam., black, minutely papillate, sometimes girt around the base by a halo of intricate brown fibres. Spores symmetrically oval-oblong, rounded at both ends, soon becoming tinged with colour, then medium-brown, 1-septate (the septum very distinct), not constricted, 24–28 × 9–10μ; sporophores oblong, colourless, about as long as the spore.

On young branches of *Quercus Robur*. Perranzabuloe, Cornwall (Rilstone). Mar.

Considered to be the pycnidial stage of *Otthia Quercus* Fckl.

There is a Microdiplodia recorded on *Quercus* on the Continent (*D. microsporella* Sacc. Syll. iii. 357, *p.p.*) which may be an early stage of this species, and there is but little doubt that *Camarosporium Quercus* Sacc. & Roum. (*q.v.* p. 101) is a later stage. The Cornish spores were all eguttulate, and showed no signs of a further development.

Fr. Belg. Germ. Ital.

Rhododendron

Diplodia Rhododendri Westd. in Bull. Acad. Roy. Belg. 1852, vol. xix, no. 9. Sacc. Syll. iii. 363. All. vii. 153.

Pycnidia hypophyllous, scattered, immersed, then semi-emergent, hemispherical, black, papillate, looking like little black dots. Spores ovoid or ovoid-oblong, somewhat constricted, dark smoky-brown, 16–21 × 9–11μ.

On leaves of *Rhododendron*, occupying dead portions. Aberdeen (Trail). Apr.–Sept.

Fr. Belg.

Rhus

Diplodia Rhois Sacc. Myc. Ven. no. 1021; in Mich. i. 254; Syll. iii. 334; x. 263. All. vii. 154.

Pycnidia gregarious or clustered here and there, covered by the blistered epidermis, at length erumpent, globose, papillate, black. Spores oblong, constricted, smoky-brown, $20–22 \times 8–10\,\mu$.

On dead branches of *Rhus glabra*. Kew Gardens (Cooke).

Saccardo says that it occurs in company with *Botryosphaeria Berengeriana* de Not. *D. rhoina* C. & H. (in Grevill. 1880, ix. 6) appears to differ in being scattered, and having larger spores, but (?).

Germ. Ital.

Ribes

Diplodia Ribis Sacc. in Mich. i. 518; Syll. iii. 344; see also Died. 628. Cf. *D. Grossulariae* Sacc. & Sch. Syll. iii. 344. Died. 627. All. vii. 154. Mig. 334.

Pycnidia $400–500\,\mu$ diam., scattered or $\pm$ seriate or gregarious, emerging, subglobose, blackish; peridium of many parenchymatous layers, the outer ones with thick dark-brown walls, changing inwards into a greenish-olivaceous tissue which bears the sporophores. Spores oblong, obtuse at both ends, 1-septate, rarely constricted, dark-brown, but not fuliginous, hardly ever guttulate, $19–24 \times 6–9\,\mu$; sporophores oblong, thick, about as long as the spore or shorter.

On twigs of *Ribes nigrum*. Blackminster; Offenham, Worcs. (Rhodes). Mar.

The young spores are olivaceous and faintly curved. It no doubt belongs to *Cucurbitaria Ribis* Niessl. Probably *D. Grossulariae*, which has not yet been found in Britain, should be merged with *D. Ribis*, for the latter occurs abroad on several other species of *Ribes*, e.g. *R. sanguineum*.

Fr. Germ. Ital. Slavonia.

Robinia

Diplodia profusa de Not. Microm. Ital. Dec. IV, no. 8. Sacc. Syll. iii. 336. All. vii. 155. Died. 628. Mig. 334.

Pycnidia gregarious or collected here and there in little clusters, immersed, then erumpent, depressed-globose, papillate. Spores obovoid, fuscous, about $22 \times 12\,\mu$, for a long time continuous, at length 1-septate, gently constricted and darker, $20–25 \times 9–11\,\mu$; sporophores $10–20 \times 1{\cdot}5–2\,\mu$.

On bark of branches of *Robinia Pseudacacia*.

Said to be the pycnidial stage of *Cucurbitaria elongata* Grev. It is intermediate between *Diplodia* and *Botryodiplodia*.

Holl. Germ. Austr. Ital. U.S.A.

Rosa

Diplodia Rosarum Fr. Summ. Veg. Scand. 417. Sacc. Syll. iii. 338. All. vii. 155. Died. p. 628, p. 552, f. 41. Mig. 334. *D. Rosae* Westd. Not. VI, p. 21.

Pycnidia scattered or gregarious, globose, papillate, thick-walled, brownish-black, at first covered by the epidermis which is sometimes blackened, but at length bursting it, 300–500 μ diam. Spores oblong-ellipsoid, usually very obtuse at both ends, 1-septate, slightly constricted but for a time eseptate, brown, 18–25 × 9–12 μ; sporophores hyaline, filiform, soon vanishing.

On branches of *Rosa*. Kew Gardens; Suffolk; Hereford; etc. Winter.

According to Fuckel it is the pycnidial stage of his *Otthia Rosae*. When young the spores may measure only 16 × 6 μ, and there is a small-spored form, *Microdiplodia Rosarum* (Died. p. 597, f. 32) with spores only 10–13 × 4–5 μ, occurring in Germany with the large-spored form. The var. *santonensis* Brun. is said to differ in having the epidermis not blackened, but this is seen also in our specimens.

Diplodia rhodophila Passer. Fung. Nov. Ven. no. 34 (Sacc. Syll. x. 277) differs in the non-constricted spores measuring 15–17·5 × 7–7·5 μ; but this has a variety *canina* Brun. (Sacc. Syll. xiv. 930), on prickles and branches, having spores with two large guttules and measuring 17–18 × 8–10 μ. All these form a series in which no subdivision seems possible; and *D. spurca* (Wallr.) Sacc. may be added as another ingredient in the welter of confusion.

Europe, U.S.A.

Rubus

Diplodia Rubi Fr. Summ. Veg. Scand. 417. Sacc. Syll. iii. 339. All. vii. 157. Died. 630. Mig. 335.

Pycnidia scattered, covered by the epidermis, prominent, subglobose, black. Spores ellipsoid, rather strongly constricted, dark-brown, 15–20 × 8–10 μ; sporophores about as long, 1–2 μ wide.

On dead branches of *Rubus fruticosus*. King's Cliffe; Barnet; Swanscombe; Droitwich; Lapworth, Wk.; Barnett's Hill, Ws.; etc.

The pycnidial stage of *Didymosphaeria diplospora* Rehm.

The normal form is accompanied in Germany by what seems to be a more highly developed form, *Botryodiplodia Rubi* Syd. (in

Hedwig. 1900, p. 4; see Sacc. Syll. xvi. 924; All. vii. 931; Died. 647; Mig. 342), which has not yet been found in Britain. Both these forms have been found, on the Continent, on *Rubus idaeus* also.

Europe, N. America.

Salix

Diplodia salicina Lév. in Ann. Sci. Nat. 1846, v. 292. Sacc. Syll. x. 286. All. vii. 169. Died. 630. Mig. 335.

Pycnidia gregarious, immersed, covered by the epidermis, then erumpent, globose, black, with a papillate and at length deciduous ostiole. Spores ellipsoid-oblong, 1-septate, gently constricted, colourless, then smoky-brown, sometimes biguttulate, $20–24 \times 8–11\,\mu$; sporophores hyaline, $10–12 \times 1{\cdot}5–2\,\mu$.

On twigs of *Salix* (*alba*, *Caprea*, etc.). Common: Kew; Shere; Forden; Sutton Coldfield; Bagshot; Marlborough; Cheshire; etc. Jun.–Dec.

The pycnidial stage of *Cucurbitaria salicina* Fckl.

The spores may be extruded while still uncoloured, and can remain for a long time without a septum though coloured. See also *Microdiplodia Salicis* Died., *supra*. Cf. *Discula macrosperma*, *infra*, p. 127.

Fr. Holl. Germ. Ital.

Sambucus

Diplodia sambucina Sacc. in Mich. ii. 268; Syll. iii. 345. All. vii. 160.

Pycnidia gregarious or somewhat clustered, covered by the epidermis, at length erumpent and superficial, minute, subglobose, papillate, deep-black. Spores ovoid-oblong, gently constricted, smoky-brown, $18–20 \times 9–11\,\mu$.

On dead branches of *Sambucus nigra*. Kew Gardens; Highgate (Cooke).

Fr. Holl. Ital. U.S.A.

Sarothamnus

Diplodia Sarothamni Cooke & Harkn. Californian Fung. in Grevill. xii. 93 (1884). Sacc. Syll. iii. 337. Cf. *D. Oudemansii* Sacc. & Syd. Syll. xiv. 939. All. vii. 160, which = *D. Sarothamni* Oud. Contr. Fl. Myc. Pays-Bas, xv. 13. Sacc. Syll. xi. 519.

Pycnidia gregarious or scattered, covered, depressed-convex, black, about $500\,\mu$ wide; epidermis torn open by the black ostiole. Spores elongate-ellipsoid, obtuse at both ends, sometimes slightly constricted, fuscous-brown, frequently biguttulate, $17–19 \times 7–9\,\mu$.

On branches of *Sarothamnus scoparius*. Swanscombe (Cooke). Ayrshire (Boyd). Feb.–Jun.

The Swanscombe specimens are identical in all respects with those from California to which Cooke and Harkness gave the name *D. Sarothamni*.

Holl. California.

Diplodia Saccardiana Speg. in Mich. ii. 270 (1881). *Sphaeropsis Saccardiana* Sacc. Syll. iii. 292. (Not *D. Saccardiana* Sacc. Syll. xiv. 932. All. vii. 161, with fig. Tassi, in Atti Accad. Siena, 1896, viii. 64, and Rev. Mycol. 1896, p. 167, pl. 171, f. 11.) Cf. also *D. Oudemansii* Syll. xiv. 939.

Var. **anglica** Grove, in Journ. Bot. 1916, p. 192, pl. 543, f. 2.

Pycnidia gregarious, rather large, globose, prominent, 250–500 μ diam., covered by the epidermis which is at length torn, bullate, black, pierced by a very small round pore; peridium rather solid, somewhat parenchymatous, dark-olivaceous. Spores exceedingly variable, for a long time colourless, clouded, oily, ovoid, then biguttulate, 13–16 × 6–7 μ (supported on rather thick straight hyaline pedicels, 1 μ broad and twice as long as the spore), afterwards brownish-olive, obovoid or fusoid or clavulate, at times inequilateral or somewhat curved, obtuse at both ends, finally 1-septate in the middle, occasionally biseptate, gently constricted, 17–20 (or even 24) × 5–8 μ.

On dead branches of *Sarothamnus scoparius*. Caughley, Shropshire (J. W. Ellis). Fenni Fach, Brecon (Rhodes). On *Spartium junceum*, in garden, Polperro (Rilstone & Rhodes). Mar.–Jul.

There can be little doubt that these specimens are closely allied to Spegazzini's species, though differing from it in the total absence of the described "striae" and in a few other particulars. They may be (?) identical with *Diplodia Sarothamni* Oud. But it is possible that they should be placed in another (new) genus. Tassi's *D. Saccardiana* was on *Solanum jasminoides*.

Smyrnium

Diplodia Henriquesii Thüm. Myc. Univ. no. 2087. Sacc. Syll. x. 290. All. vii. 161. *D. Smyrnii* Curr. in Herb. (*nomen nudum*). ? *Sphaeropsis Smyrnii* Sacc. Syll. x. 252.

Pycnidia scattered, often arranged in lines, but usually standing singly, rarely confluent, globose, nearly free, very

minute, elevated, shining, black. Spores cylindrical, always nearly straight, rounded at the ends, not constricted, dark-fuscous or smoky-brown, opaque, 20×7–8μ.

On dry stems of *Smyrnium Olusatrum*. Lewes; Castle Hill, Scarborough. Aug.

Port.

Solanum

Diplodia Dulcamarae Fckl. Symb. Myc. 175. Sacc. Syll. iii. 366. All. vii. 161. Died. 631. Mig. 336.

Pycnidia arranged in rows, confluent, erumpent, globose, papillate, irregular, black, about 300μ diam. Spores ovoid-oblong, fuscous-brown, 1-septate, constricted, 20–25×8–13μ; sporophores subulate, 12–15×2–$2{\cdot}5\mu$.

On dry branches of *Solanum Dulcamara*. Considered to be British. *n.v.*

Fuckel regarded this as the pycnidial stage of *Cucurbitaria Dulcamarae* Fr.

Germ. Port. Finland.

Syringa

· **Diplodia Syringae** Auersw. in Fckl. Symb. Myc. 1869, p. 395. *Sphaeria Syringae* Fr. Syst. Myc. ii. 492 (1823). *Sphaeropsis Syringae* P. & C. 30th Rep. N.Y. State Mus. p. 52. Sacc. Syll. iii. 298. *D. Lilacis* Westd. in Bull. Acad. Roy. Belg. 1852, xix. 119. Sacc. Syll. iii. 346. All. vii. 165. Died. 633. Mig. p. 337, pl. 41, f. 6, pl. 42, f. 1–4.

Pycnidia scattered or gregarious, 300–400μ diam., globose or elliptic, papillate, black, covered by the epidermis which is often cleft by a straight fissure. Spores colourless, ellipsoid, continuous, then smoky-brown, 1-septate, gently constricted, often guttulate, 22–28×8–10μ; sporophores hyaline, stout, mucoid, 8–12 or more $\times 2$–$2{\cdot}5\mu$.

On bark of dead twigs of *Syringa vulgaris*. Shrewsbury; King's Lynn; Hartlebury Common; Dodderhill Common; etc. Mar.–Jun.

Said to be the pycnidial stage of *Cucurbitaria occultata* Oud.

Spores mostly ellipsoid (but very variable, ovate, obovate, pyriform, etc.), hyaline, then yellowish-brown, then fuliginous, continuous even then, at length 1-septate, as much as 36μ long and 12μ broad.

Fr. Belg. Germ. Austr. Ital. Roumania, Swed. N. Amer.

Taxus

Diplodia Taxi de Not. Microm. Ital. dec. IV. f. 9. Sacc. Syll. iii. 359. All. vii. 165. Died. 634. Mig. 337. *Sphaeria Taxi* Sow. Engl. Fung. pl. 394, f. 6. *Sphaeropsis Taxi* Berk. Outl. 316. Cooke, Handb.

428. *Cryptosphaeria Taxi* Grev. Scot. Cr. Flor. pl. 13. *Phoma Taxi* Sacc. Syll. iii. 102. *Macrophoma Taxi* Berl. & Vog. in Syll. Addit. 308; Syll. x. 194. Massee, Dis. Cult. Pl. 410.

Pycnidia amphigenous, gregarious, immersed, convex, blackish, covered by a minute cinereous patch of the epidermis, at length piercing it by a pore. Spores ellipsoid-oblong, rounded at both ends, for a long time colourless, at length 1-septate, slightly or not constricted, smoky-brown, 20–25 × 8–10 μ; sporophores linear-subulate, about 15 × 1·5–2 μ.

On dead leaves of *Taxus baccata*. Apethorpe; Forden; Bristol; Hadzor Hall, Worcestershire; Shropshire; Scarborough; Kelso; Ulster, etc. Sept. Oct.

Recorded in Germany on the branches also; it can attack the living leaves. At Hadzor it has destroyed the greater part of a long avenue of clipped yews, completely killing many of them. The leaves turn brown, at first singly, afterwards in great numbers, and are covered thickly with black dots, but mature spores are not abundant.

In Germany it is associated with a Microdiplodia with brown spores, 10–12 × 4–5 μ, involved in mucus.

Europe.

Tecoma

Diplodia Tecomae Passer. in Hedwig. 1877, p. 119. Sacc. Syll. iii. 347. All. vii. 166. Died. 635. Mig. 337.

Pycnidia solitary or in groups, erumpent, subglobose, black, papillate, rugose. Spores ± oblong, 1-septate, not constricted, chestnut-brown.

Var. **affinis** Sacc. *l.c.* iii. 348.

Pycnidia rather large, with a globose papilla. Spores somewhat constricted, fuliginous-black, 22–23 × 10 μ; sporophores short.

On dead stems of *Tecoma radicans*. King's Lynn (Plowright). Feb.

Plowright named these specimens "*Diplodia Begoniae* C.B.P.", in his own handwriting, in 1871, but the name appears not to have been published.

Fr. Germ. Ital.

Thuja

Diplodia Thujae Westd. in Bull. Acad. Belg. ser. 2, vol. ii. no. 7 (1857). Otth, in Mitth. Bern, 1868, p. 59. Sacc. Syll. xi. 521; see also Syll. iii. 359 and xiv. 938. All vii. 167. Died. 635. Mig. 338. *D. Otthiana* All. vii. 166 (1901).

Pycnidia amphigenous and on the stems, scattered, very small, covered by the blackened epidermis. Spores oval, colourless, then fuscous-brown, rounded at both ends, continuous, then 1-septate, 18–21 × 9–10μ.

On dry twigs of *Thuja occidentalis*. Hadzor Hall, Ws. (Rhodes).

D. Thujae Westd. was on the leaves, but is probably the same as that of Otth on the twigs.

Belg. Germ.

Tilia

Diplodia Tiliae Fckl. Symb. Myc. 394. Sacc. Syll. iii. 330. All. vii. 167. Died. 636. Mig. 338.

Pycnidia scattered, covered, of moderate size, globose, black; ostiole papilliform, erumpent. Spores oblong, hardly constricted at the septum, very dark-fuscous, 20–24 × 8–10μ, issuing in a very long slender black tendril; sporophores about 10 × 1·5μ.

On dry twigs and branches of *Tilia*. Kew Gardens; Blackheath; Scarborough; Hebden Bridge. Oct.

There is also known a non-British small-spored form, *Microdiplodia Tiliae* All. vii. 96 (Sacc. Syll. xviii. 326), with spores 6–12 × 3–4μ. Cf. also *D. Scheidweileri*.

Fr. Germ. Denm. Roumania.

Diplodia Scheidweileri Sacc. Syll. iii. 330. All. vii. 167. *Sphaeropsis Scheidweileri* Westd. in Kickx, Flor. Crypt. Flandr. i. 401.

Pycnidia immersed, globose-depressed, erumpent and then somewhat prominent, papillate, at length circumscissile above. Spores for a long time continuous and hyaline, then 1-septate, constricted, smoky-brown, 25 × 15μ; sporophores as usual.

On dead bark of *Tilia*. Near Bristol. *n.v.*

Fr. Belg.

Ulex

Diplodia Ulicis Sacc. & Speg. in Mich. i. 353; Sacc. Syll. iii. 337. All. vii. 168.

Pycnidia gregarious, immersed, then erumpent, globose, minutely papillate, 200μ diam. Spores ovoid or ellipsoid, rather obtuse at both ends, usually continuous, often with

one or two guttules, then 1-septate, smoky-olivaceous, 20–25 × 10–11 μ; sporophores filiform, hyaline, about 5 × 1 μ.

On rotting branches of *Ulex europaeus*. Frant, Sussex (Cooke). On twigs and prickles of *Ulex*, near Haverfordwest, Pemb. (Rhodes), spores narrower, 23 × 8 μ. July.

Ital.

Ulmus

Diplodia melaena Lév. in Ann. Sci. Nat. 1846, v. 292. Sacc. Syll. iii. 349. All. vii. 168. Died. 636. Mig. 338.

Pycnidia gregarious, crowded, covered by the epidermis, black, globose, with no distinct ostiole. Spores oblong, smoky-brown, 20–25 × 8–10 μ, sometimes expelled and blackening the matrix; sporophores 15 × 1–2 μ.

On bark of branches of *Ulmus campestris*. Kew Gardens; Banbury. Oct.–Apr.

There is also a small-spored form (not yet recorded in Britain), *Microdiplodia melaena* Allesch. vii. 96 (Sacc. Syll. xviii. 328), which has spores 7–11 × 3–4 μ, on the same host. Lind says that this species is a true parasite on the smaller twigs of *Ulmus montana*. Fuckel assigns it to his *Cucurbitaria naucosa*.

Europe, U.S.A., Canada.

Viburnum

Diplodia Lantanae Fckl. Symb. Myc. 395. Sacc. Syll. iii. 346. All. vii. 169. Died. 637. Mig. 338.

Pycnidia rather large, 8–12 together, confluent in little clusters, globose or irregular, black, glabrous above, but delicately pilose beneath, papillate, bursting in pustules through fissures in the bark. Spores oblong, fuscous, 20–24 × 8 μ; sporophores about half as long.

On dry branches of *Viburnum Lantana*. Kew Gardens; Darenth (Cooke).

Holl. Germ. Ital.

Diplodia Opuli Passer. in Atti R. Accad. Linc. Rom. Mem. 1889, vi. 465. Sacc. Syll. x. 281. All. vii. 170. Grove, in Journ. Bot. 1918, p. 317. *Phoma hyalina* Sacc. Syll. iii. 88, var. *Viburni*.

Pycnidia gregarious, globose, with a papillate ostiole, black, about 500 μ diam., sometimes two joined together, long covered by the bark, the ostiole then piercing it by a short

slit and at length circumscissile, falling off, and leaving a wide circular opening; peridium thick, parenchymatous, dark-brown with an underlying purplish tinge. Spores oblong-ellipsoid, obtusely rounded at each end, thick-walled, for a long time colourless, very granular within, continuous, $21–27 \times 8–10\mu$ ("at length 1-septate, dingy-yellowish, not constricted, $20 \times 10–12\mu$," Pass.); sporophores stout, nearly as long.

On dead twigs of *Viburnum Opulus*. Cheshire (Ellis) with eseptate spores. Apr.

Doubtless merely an early state of Passerini's species.
Ital.

Diplodia Tini Sacc. in Mich. ii. 269; Syll. iii. 359. All. vii. 170.

Pycnidia immersed, at length erumpent, globose-conical, minute, very black. Spores oblong-ovoid, 1-septate, not constricted, fuliginous, about $22 \times 12\mu$.

Var. **ramulicola** Sacc. Syll. iii. 360.

On branches of *Viburnum Tinus*. Heythrop Park, Oxon. June.

It was accompanied by and mixed with *Coryneopsis microsticta*. The type-form of this Diplodia was found in Italy on the leaves of *V. Tinus*. Cf. also *D. Lantanae* and *D. Opuli*.
Fr. Ital.

Vitis

Diplodia viticola Desm. in Ann. Sci. Nat. 1838, x. 311. Cooke, Handb. 432. Sacc. Syll. iii. 332. All. vii. 172. Died. 637. Mig. 339.

Pycnidia scattered or arranged in lines, occasionally confluent, subglobose, at first covered, at length erumpent and even superficial, thick-walled, with a very minute pore, black, up to 750μ diam. "Spores for a long time continuous, hyaline, ovoid or ellipsoid, at length dark-brown, 1-septate, slightly constricted, biguttulate, $16–22 \times 7–12\mu$; sporophores indistinct" (Died.).

On branches of *Vitis vinifera*. King's Cliffe, Northamptonshire; Kew Gardens; North Wootton. Mar. Apr.

I have examined numerous exsiccata of this species, but none of them contained any spores.
Fr. Belg. Germ. Ital. U.S.A.

MACRODIPLODIA Sacc. Syll. iii. 374.

Pycnidia on branches, immersed in the cortex, rather large, resembling a Massaria, pierced by a pore. Spores large, oblong, 1-septate, fuliginous, involved in a hyaline slimy layer; sporophores short.

The species are all, presumably, pycnidial stages of species of Massaria or allied genera.

Tilia

Macrodiplodia Curreyi Sacc. & Roum. in Rev. Mycol. 1884, p. 33, pl. 42, f. 10. Sacc. Syll. iii. 374. All. vii. 174, with fig. Died. 639. Mig. p. 339, pl. 40, f. 1–3.

Pycnidia gregarious, Massaria-like, globose, covered, then erumpent by a little fissure. Spores oblong, rounded especially at the upper end, septate in the middle, scarcely constricted, dark smoky-brown, surrounded by a narrow mucous layer, 50–60 × 15–18 μ, at length expelled and staining the matrix around the mouth; sporophores linear, hyaline, about 10 μ long. (Fig. 42.)

On bark of branches of *Tilia europaea*. Blackheath (Cooke).

This is believed to be the pycnidial stage of *Massariella Curreyi* Sacc.

Fr. Germ.

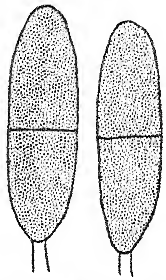

Fig. 42. *Macrodiplodia Curreyi*: spores, × 600.

Ulmus

Macrodiplodia Ulmi Sacc. Syll. iii. 374. All. vii. 174, with fig. on p. 3 called "Sphaeropsis". Died. 639. Mig. 339. *Sphaeropsis* (*Macroplodia*) *Ulmi* Sacc. & Roum. in Rev. Mycol. 1884, p. 33, pl. 43, f. 15. Sacc. Syll. iii. 305. *Macrophoma Ulmi* Fautr. in Bull. Soc. Myc. Fr. 1899, p. 155. Sacc. Syll. xvi. 883.

Pycnidia nestling in the outer portion of the bark, one-third as large as the perithecia of the ascophorous stage, i.e. less than 500 μ wide; contents dingy-white. Spores oblong-lanceolate, colourless and continuous for a long time, then 1-septate, smoky-brown, provided with a very narrow hyaline mucous border, about 64 × 26 μ.

On bark of branches of *Ulmus campestris*. No certain locality known in Britain.

The pycnidial stage of *Massaria Ulmi* Fckl., by which it is usually accompanied. *Macrophoma Ulmi* is its forerunner, whose spores measure about $30 \times 10 \mu$. *Sphaeropsis Ulmi* Sacc. Syll. iii. 305 is only an immature eseptate state of the Macrodiplodia, having spores $60–70 \times 14 \mu$. The specimens placed by Cooke under *Macrodiplodia Ulmi*, in Herb. Kew, from Kidbrooke and Jedburgh, are *Diplodia melaena* Lév.

Fr. Germ.

DIPLODIELLA Karst. in Hedwig. 1884, p. 62.

Pycnidia superficial, usually growing on wood, globose, papillate, black, glabrous, subcarbonaceous. Spores ellipsoid or oblong, 1-septate, coloured.

Brassica

Diplodiella Brassicae, comb. nov. *Diplodia Brassicae* Cooke, in Herb.

Pycnidia small, scattered, rounded-conical, black, shining, papillate, seated quite superficially on the wood; texture parenchymatous, dark-fuscous. Spores oblong or ellipsoid, rounded at the ends, for a long time eseptate, at length with a faint median septum, pale fuscous-brown, occasionally guttulate, about $8–10 \times 3 \mu$ when mature.

On dead decorticated stalks of Cabbage (*Brassica*). Shere; Swanscombe (Cooke), in company with a species of Pleospora. It might be an old state of a Microdiplodia.

Cotton

Diplodiella Cowdellii Sacc. Syll. iii. 377. *Diplodia Cowdellii* B. & Br. in Ann. Nat. Hist. 1850, v. 371. Cooke, Handb. 432.

Pycnidia free, globose, black, at length dehiscing at the apex. Spores ellipsoid, at length 1-septate, not constricted, pale smoky-brown, reaching about $8–10 \times 3 \mu$, but usually smaller.

On the thick cotton curtains of a shower bath, which were constantly damp. Oundle, Northamptonshire.

"Forming dirty-black spots on the matrix, but without any evident floccose stratum. Pycnidia globose, black, at length cracking above. Remarkable for its singular habitat and free mode of growth" (B. & Br.). Remains unique, but it may be merely a form of one of the others (*D. fibricola, D. oospora*).

Populus

Diplodiella fibricola Sacc. Syll. iii. 376. All. vii. 179. *Diplodia fibricola* Berk. in Hook. Journ. Bot. 1853, v. 42, pl. 3, f. 12. Cooke, Handb. 433. *Phoma fibricola* Berk. *ibid.* p. 41, pl. 3, f. 1.

Spots pallid or inconspicuous. Pycnidia minute, elongated. Spores small, ellipsoid, somewhat constricted in the centre and septate, pallid ochraceous-brown, 6 μ long.

On bare wood of *Populus fastigiata*, etc. King's Cliffe (Berk.). Bristol (Bucknall). Highgate (Cooke). Nov. Dec.

Recorded by Berkeley on an Elm plank, picked up in Lat. 76° 2′ N., Long. 96° W., and on Ash and Oak.

"Pycnidia minute, ± elongated, following the course of the fibres, rather delicate and easily lacerated, either scattered or disposed in distinct patches, sending off a few fibres from their base. Spores minute, subelliptic, pale yellow-brown, 1-septate or very rarely acquiring a second septum" (Berk.).

A beautiful Russian specimen of this species on decorticated *Salix* has similar pycnidia; the spores are exactly ellipsoid or occasionally somewhat acute at the ends, pale smoky-brown, 1-septate when mature, but not constricted, measuring about $6{\cdot}5 \times 3\,\mu$. Pycnidia very minute, seldom reaching 300 μ in length.

Ascochyta fibricola Sacc. Syll. iii. 401 seems to be a very similar species, if not identical. They may both belong to Ascochytula. Moreover, there seems to be no reason why we should not refer here *Aposphaeria fibricola* (Berk.) Sacc. (*q.v.* Vol. I, p. 136).

Fr. Germ. Russ.

Quercus

Diplodiella quercella Sacc. Syll. iii. 376. All. vii. 179. Died. 644. *Diplodia quercella* Sacc. & Penz. in Mich. ii. 623.

Pycnidia somewhat superficial, scattered, globose, papillate, black, 200–300 μ diam. Spores oblong, very slightly constricted at the septum, smoky-brown, $18–19 \times 7–9\,\mu$; sporophores subcylindrical, hyaline, $15–16 \times 2–2{\cdot}5\,\mu$.

On hard decorticated wood of *Quercus*. Shere (Cooke).

Cooke's other specimen in Herb. Kew, on Oak from Bishop's Wood, Highgate, under this name, seems to tend towards *Botryodiplodia*. It has oblong spores, rounded at both ends, irregular, with each loculus uniguttulate, $20–25 \times 8–9\,\mu$; the pycnidia are crowded together in short lines; sporophores cylindrical, hyaline, $15 \times 3–4\,\mu$.

Fr.

Salix

Diplodiella oospora Sacc. Syll. iii. 376. All. vii. 180. *Diplodia oospora* Berk. in Hook. Journ. Bot. 1853, p. 42, pl. 3, f. 11. Cooke, Handb. 433.

Spots olivaceous. Pycnidia minute, elongated. Spores obovoid, $7 \cdot 6 \times 6 \mu$.

On bleached wood of *Salix*. King's Cliffe (Berk.). King's Lynn (Plowright). Nov. Dec.

"Patches oblong, olive-brown from the fibres of the mycelium; pycnidia minute, elongated; spores minute, obovate, yellow-brown, 1-septate, much darker than in *D. fibricola*" (Berk.). This species is very similar to *D. fibricola* and probably identical, but the spores are certainly not so pale and are broader in comparison with their length. I make them at the most 6μ long and then $3 \cdot 25 \mu$ broad, but others measure $5 \times 4 \mu$; all are obovoid, rounded at both ends.

Austr.

BOTRYODIPLODIA Sacc. in Mich. ii. 7; Syll. iii. 377.

Pycnidia in dense clusters, immersed in a basal stroma, erumpent, between membranaceous and carbonaceous, often with a distinctly papillate ostiole. Spores oblong or obovoid, 1-septate, smoky-brown; sporophores short, oblong.

The spores of this genus are most frequently met with in an immature state, i.e. uncoloured or not yet septate. Moreover, there are always conditions in which the pycnidia are few in each cluster or even at times stand singly. Botryodiplodia is therefore merely a clustered state of Diplodia; but see also Dothiorella, which in some cases is merely a younger state of a Botryodiplodia. The stroma may be due in many cases only to the oncoming of the ascophorous state, so that Diplodia and Botryodiplodia should form one genus.

Daphne

Botryodiplodia confluens Sacc. Syll. iii. 378. All. vii. 184. *Diplodia confluens* B. & Br. in Ann. Nat. Hist. 1850, v. 372. Cooke, Handb. 431.

Pycnidia confluent, forming small flat patches 1–3 mm. long, irregular, somewhat collapsed, surrounded by the ruptured epidermis; ostiole inconspicuous. Spores oblong, brown, continuous while immature, then 1-septate, not or faintly constricted, $25–28 \times 10–11 \mu$.

On twigs of *Daphne Laureola*. Milton, Norths. (Berk.). Eastbourne (C. J. Muller).

"Forming small often confluent spots, surrounded by the free raised epidermis. Pycnidia irregular, confluent, depressed, somewhat collapsed, with no evident ostiole" (B. & Br.). When young it is very like a Dothiorella.

Fr.

Fraxinus

Botryodiplodia Fraxini Sacc. Syll. iii. 378. All. vii. 184. Died. 646. Mig. 342. *Ascochyta Fraxini* Lib. *sec.* Petrak. *Diplodia Fraxini* Fr. Summ. Veg. Scan. 417. *Botryodiplodia sphaerioides* Sacc. Syll. iii. 379. *Dothiora sphaeroides* Cooke, Handb. 429 (*non* Fries). *Macrophoma Fraxini* Delacr. Sacc. Syll. x. 191. *Discula macrosperma* Sacc. var. *Fraxini* Grove, in Journ. Bot. 1912, p. 52, pl. 516, f. 13. *Dothiorella Fraxini* Sacc. Syll. x. 230 (with spores not yet coloured). Cf. *Diplodia inquinans*, *supra*, p. 42.

Pycnidia crowded, caespitose, erumpent, globose, more or less papillate, black, up to 500μ diam. Spores cylindric-oblong or sub-clavate, rather thick-walled, sometimes curved, 1-septate, smoky-brown, 20–30 × 9–10μ; sporophores hyaline, erect, shorter than the spore.

On dead twigs and branches of *Fraxinus excelsior*. Common. Mar.–May.

Pycnidia in little clusters of 2 or 3, or (more rarely) solitary, arising beneath the bark, not confluent, at length erumpent by the ostioles, and either surrounded by the laciniae or forming a flat disc to which the bark is closely adherent, black, whitish within when young. Spores abundant, but generally immature, remaining for a long time hyaline (*Phoma hyalina* Sacc. *p.p.*) and eseptate, in which condition it is *Macrophoma Fraxini* Delacr. Then they assume a pale-brown colour and the protoplasm is divided into two parts; at length they become 1-septate, dark-brown, and larger, measuring sometimes as much as 35 × 15μ.

Dothiorella sphaeroides Rostr. = *Dothidea sphaeroides* Fr. = *Dothiorella populea* Sacc. is not on Ash but on *Populus*; it was Berkeley who referred the British specimens on Ash by mistake to this latter species, and thus led to the errors of Cooke and Saccardo who followed his example.

Europe, U.S.A.

Hedera

Botryodiplodia caespitosa, comb. nov. *Diplodia caespitosa* B. & Br. in Ann. Nat. Hist. 1850, v. 372. Cooke, Handb. 431. *Haplosporella caespitosa* Sacc. Syll. iii. 323. All. vii. 72. *Botryodiplodia Hederae* Jaap, in Died. 647. Cf. *Diplodia Hederae* Fckl. (*supra*, p. 42).

Pycnidia caespitose or solitary, erumpent, globose, black, up to 500μ diam., with a papilliform ostiole; texture thick,

carbonaceous. Spores oblong-ellipsoid, rounded at both ends, continuous and yellowish, but when mature 1-septate, dark-brown, $25–30 \times 11–12\mu$, with a very broad and dark septum, sometimes biguttulate.

On dead branches of *Hedera Helix*. King's Cliffe (Berk.). King's Lynn (Plowright).

The wall of the mature spore can be as much as $1·5–2\mu$ thick. In the immature continuous spores it is nearly colourless, but the protoplasm is yellowish; the spores remain for a long time in this form, which alone was known to the earlier mycologists.

Germ.

Pyrus

Botryodiplodia pyrenophora Sacc. Syll. iii. 380. All. vii. 185, with fig. Mig. p. 342, pl. 43, f. 7–10. *Dothiora pyrenophora* Cooke, Handb. 429 (*non* Karst.). *Botryodiplodia Mali* Brun. Liste Sphaerops. 38. Sacc. Syll. x. 294.

Pycnidia in little groups, erumpent, elliptical, flat or depressed, black, pallid within. Spores oblong, smoky-brown, at length 1-septate, not constricted, about $25 \times 10\mu$, but usually imperfect or even completely wanting.

On twigs of *Pyrus Malus*, *P. communis*. King's Cliffe; Apethorpe; Milton; Audley End; Kew; etc.

The clusters of this species are about 1–3 mm. diam., at first covered, then erumpent by a pore or a ± Hysterium-like fissure; at length they may resemble other Botryodiplodias, but they remain mostly sterile or have very few spores.

Botryodiplodia Mali Brun. differs only in having larger groups of pycnidia and a more definite stroma, but in view of the great variation seen in this respect in the genus it cannot be considered different.

Dothiorella pyrenophora Sacc. (*q.v.* Vol. I, p. 238) has much smaller and very different spores; but the habit is closely similar and it is probably a part of the same life-cycle. Both occur on exactly the same hosts. They are both derivatives of *Diplodia malorum*; or rather are stages of the as yet unrecognised perfect fungus to which they all serve as pycnidia.

Fr. Holl. Germ. Austr. Swed. U.S.A.

PHAEOPHRAGMIAE

Spores coloured, oblong or fusoid-linear, provided with two or more transverse septa.

I. Pycnidia standing singly, without any stroma.

A. Spores free, not united with one another.

1. Spores without bristle-like appendages.

a. Pycnidia immersed; wall rather thin, parenchymatous.
† Pycnidia glabrous . . . . *Hendersonia*
†† Pycnidia clothed at first with hairs . . *Woinowicia*

b. Pycnidia superficial; wall thick, ± carbonaceous . . . . *Hendersoniella*

2. Spores with a bristle at each end . . . [*Cryptostictis*]

B. Spores united at their bases in a cluster . . *Prosthemium*

II. Pycnidia in dense clusters or sunk in a stroma . [*Hendersonula*]

HENDERSONIA Berk. in Ann. Nat. Hist. 1841, vi. 430, emend. Sacc. Syll. iii. 418.

Pycnidia subepidermal, then erumpent, papillate or depressed, membranaceous or subcarbonaceous, dark-brown or black. Spores cylindrical or oblong or somewhat fusoid, with

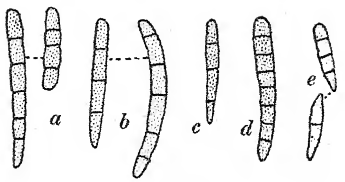

Fig. 43. *Hendersonia*: *a*, *H. crastophila*; *b*, *H. epicalamia*; *c*, *H. Letendreana*, *f. Dipsaci*; *d*, *H. pulchella*; *e*, *H. tenella*; spores, all ×600.

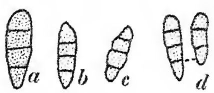

Fig. 44. *Hendersonia*: *a*, *H. Phragmitis* (from Berwick); *b*, *H. culmiseda*; *c*, *H. sarmentorum*, *f. Aucubae*; *d*, *H. Valerianae*; spores, all ×600.

two or more transverse septa, olivaceous, brownish, or (rarely) fuliginous; sporophores short. Mostly on herbaceous stems or small twigs.

The species placed in this genus fall into two groups—(1) a series which has rather slender spores, resembling in form some of the species of Septoria or Stagonospora, but coloured yellowish or brownish; many of these, but not all, inhabit grasses: and—(2) a series possessing stouter ovoid or ellipsoid spores, which approach Camarosporium in shape, and many of which are in fact species of Camarosporium in which a longitudinal septum has not yet been detected. Cf. that genus. Certain of these, while still having only one septum, might pass for Diplodia, but can be easily distinguished by the absence of the stout persistent sporophores of that genus.

Berkeley's Hendersonia included several quite colourless forms, which are now removed to Stagonospora. It is a misfortune that the first species described by Berkeley (*l.c.*) was "*H. elegans*" (now called *Stagonospora elegans*), but the inconvenience of changing the names of both genera, which it has been suggested by unthinking people is required by this fact, can be readily avoided by making "Hendersonia" Berk. emend. a *nomen conservandum*. It is a remarkable fact that not one of the British Hendersonias listed by Berkeley in the *Annals* and only a few of those listed by Cooke in the *Handbook* are now considered to belong to that genus.

The species in the following list are arranged in the simple alphabetic order of their hosts, except that those belonging to the GRAMINEAE are placed under that heading for convenience of comparison with one another.

Plurivorous

Hendersonia biseptata Sacc. in Mich. i. 95 (1877); Syll. iii. 419. All. vii. 211, with fig. Died. 650. ? *H. exigua* Cooke, in Grevill. iii. 178 (1875). Sacc. Syll. iii. 426. All. vii. 245.

Pycnidia scattered or somewhat gregarious, immersed, then erumpent by bursting the epidermis, subglobose, flattened, papillate, blackish, 80–100μ diam.; wall thin, between membranaceous and carbonaceous, distinctly parenchymatous. Spores ellipsoid, brownish, at first continuous, then biseptate, rounded at both ends, hardly constricted, 10–12 × 4–5μ; sporophores short.

On bark of twigs. Edinburgh (Cooke); Killaloe; etc. See Fung. Brit. II, no. 24, with fig.

Recorded abroad on *Capparis*, *Jasminum*, and *Prunus*. A doubtful species, for some triseptate spores remain biseptate for a considerable time, but Cooke's Edinburgh spores seem to be uniformly biseptate when mature.

Germ. Ital.

Hendersonia Letendreana Sacc. in Mich. i. 517; Syll. iii. 433. All. vii. 201.

Pycnidia gregarious, globose-depressed, immersed, then erumpent, pierced by an impressed pore, 120–130μ diam.; wall distinctly parenchymatous, smoky yellowish-brown. Spores cylindrical, curvulous or somewhat clavulate, obtuse at both ends, especially above, 3–4-septate, not constricted, honey-coloured, 25–30 × 4μ.

Forma **Stachydis**, on dead stems of *Stachys silvatica*, Hereford, Sept.; it was accompanied by *Septoria Stachydis* on the same stems.

Forma **Dipsaci**, on dead stems of *Dipsacus silvestris*, Credenhill Camp, Hereford, June; spores 20–25 × 2μ. (Fig. 43 *c*.)

The description given above is that of Saccardo's type-specimen on *Convolvulus*; he also describes a var. *muralis* on *Parietaria* (spores 2–3μ broad).

Fr. Spain (on *Hieracium*).

Hendersonia sarmentorum Westd. in Bull. Brux. xviii, no. 60, f. 2. Cooke, Handb. 435; Seemann's Journ. Bot. iv, f. 15. Sacc. Syll. iii. 420. All. vii. 191. Died. 662. Mig. 358.

Pycnidia scattered, subglobose, blackish, numerous, up to 250μ diam., covered and concealed by the epidermis, flattened, greyish-brown, opening by a pore; epidermis at length torn above; wall pale-brownish under the microscope. Spores ellipsoid, obovoid, or irregular, entirely of a pale colour, yellowish or brownish, often curvulous, slightly constricted, 1-septate, then 3-septate, 10–14 × 4–5μ; sporophores hyaline, a little longer than the spore.

On dead twigs of the most various plants. Common.

This is, in its present state, an almost useless collective name; the following are some of the British records:

On *Aucuba*, Pembrokeshire (Rhodes). (Fig. 44 *c*.)

On *Berberis vulgaris*, Clyde (spores $12–17 \times 4–5\mu$, and $8–11 \times 4–4{\cdot}5\mu$ in the same pycnidium); Herefordshire.

On *Hedera*, Aberdeen (Trail).

On *Hypericum*, Ayrshire (Boyd).

On *Ribes Grossularia*, Swaledale, Yorks. (Mason).

On *Vitis vinifera*, Kew; Highgate; Kidderminster; King's Lynn.

The form recorded under this name on *Acer campestre*, Gloucestershire (Rhodes), developed ultimately into *Camarosporium ambiens* (*q.v.*), p. 90.

A so-called variety, which presented greater differences than most of them do, was named:

Hendersonia sarmentorum, var. *Lauri* Cooke, in Grevill. xiii. 97 = var. *laurina* Sacc. Syll. x. 321.

Spores at first quite colourless, then pallid, at length clear fuscous (i.e. greyish)-brown, eguttulate, never dark-brown, 1–3-septate, measuring when young $10 \times 5\mu$, when mature $15–16 \times 5\mu$ or even up to 20μ long.

On leaves of *Laurus nobilis*. Kew Gardens (Cooke), spores about $18 \times 5\mu$. Hadzor Hall (Rhodes). Jan. Feb.

But it is quite certain that this is merely a young state of *Camarosporium Lauri* Grove (*q.v.*), p. 97.

Among other hosts of *H. sarmentorum* recorded abroad are: *Ampelopsis, Ailanthus, Calycanthus, Campanula, Galega, Galium Aparine, Jasminum, Morus, Populus, Rubus, Salix, Sambucus*, etc. See Sacc. Syll. xxii. 1059.

Europe, N. America.

Hendersonia vagans Fckl. Symb. Myc. 392. Sacc. Syll. iii. 419. All. vii. 208. Died. 663. Mig. 358. Grove, in Journ. Bot. 1918, p. 318.

Pycnidia oblong, covered by the epidermis, then elevating and cracking it, black. Spores oblong-ellipsoid or subcylindric, 2- or 3-septate, pallid-yellowish, then brown, hardly constricted, $12–18 \times 5–7\mu$, all the loculi nearly of the same colour; sporophores slender, about as long as the spore.

On bark of *Salix*, Kew Gardens; Hampstead (Cooke). On *Thuja*, Stratford-on-Avon (Vize). On *Fraxinus*, Evesham (Rhodes). On *Polygonum*, Edgbaston, Birmingham.

The spores can have 0–3 septa, and are occasionally equally biseptate. The species is recorded abroad also on *Crataegus, Prunus, Pyrus, Rubus, Sorbus*, and prickles of *Rosa*. But I think many of the specimens I have seen are nothing but early states of Coryneopsis, except those on Polygonum and Salix which belong to Camarosporium.

Holl. Germ. Denm. Austr. Ital. Spain.

Araucaria

Hendersonia Araucariae Thüm. Myc. Univ. no. 682. Sacc. Syll. iii. 430. All. vii. 194.

"Pycnidia small, spurious, scattered, amphigenous, erumpent, somewhat conical, perforating the epidermis. Spores shaped like an elongated jar, plano-truncate at both ends, 3-septate, faintly constricted at each septum, with equal loculi, pale-fuscous, shortly pedicellate, $15 \times 5\mu$ without the pedicel; pedicel hyaline, evanescent, $4–5\mu$ long, gently dilated above" (Sacc.).

On fallen leaves of *Araucaria imbricata*, with *Phomopsis Araucariae*, Batten Hall, Worcester. Mar.

Austr. Ital.

Cornus

Hendersonia Fiedleri Westd. in Kickx, Fl. Cr. Flandr. i. 389. Sacc. Syll. iii. 421. All. vii. 202. Died. 651. Mig. 353. *H. Corni* Fckl. Enum. Fung. Nass. no. 416, f. 16; Symb. Myc. 392. Cooke, Handb. p. 435, f. 158; Seemann's Journ. Bot. iv. 110, f. 16.

Pycnidia gregarious, globose, black, 300μ diam., at first covered by the epidermis, which is raised and at length stellately cracked over each. Spores oblong or subclavate, obtuse at the ends, 3-septate, yellow, then pale-brown, $15–18 \times 4–5\mu$, the lowest cell more hyaline; sporophores filiform, soon deliquescing.

On twigs of *Cornus alba*, *C. sanguinea*. Highgate; Mickleham; Ham Castle and Abberley, Worcs. Feb.–May.

Said to be the pycnidial stage of *Metasphaeria Fiedleri* Sacc.

H. cornicola Curr. in Linn. Soc. Trans. 1859, xxii. 333, pl. 59, f. 146, is on leaves of *Cornus* and has similar spores, but is not known as British. Cf. Coryneopsis, to which many of the specimens really belong.

Fr. Belg. Holl. Germ. Ital.

Var. **Symphoricarpi** Cooke, in Grevill. xiii. 97. Sacc. Syll. x. 322. All. vii. 202, 240. Died. 661.

Spores 3-septate, pale-coloured, $18 \times 4\mu$.

On slender twigs of *Symphoricarpus racemosus*. Kew Gardens; Swanscombe (Cooke).

Coronilla

Hendersonia Coronillae Cooke, in Grevill. xiii. 97. Sacc. Syll. x. 319. All. vii. 195. *Diplodia Genistarum* Cooke, in Grevill. xiii. 96, *p.p.* *Microdiplodia Genistarum* All. vii. 84.

Pycnidia scattered or gregarious, covered by the epidermis which is slightly elevated and at length pierced, subglobose or depressed, black, 150–200μ diam. Spores at first like those of a Diplodia, ellipsoid, 1-septate, brown, 10–12 × 6μ, then elongated, straight or slightly curved, 3-septate, not constricted, up to 18 × 7μ.

On slender twigs of *Coronilla Emerus*. Kew Gardens. Apr.

Cooke's statement that he found the same fungus on *Baccharis halimifolia* cannot be confirmed.

In many pycnidia almost all the spores are 1-septate, the two other septa appearing, each separately, after a time. Also *Camarosporium Coronillae* Sacc. (Syll. iii. 460) is a further development of this species. *Cucurbitaria Coronillae* Sacc. is its ascophorous stage.

Ital.

Epilobium

Hendersonia Epilobii Fautr. in Rev. Mycol. 1889, p. 152. Sacc. Syll. x. 325. All. vii. 206. J. W. Ellis, in Herb. Kew.

Pycnidia oblong, arranged somewhat in rows, black, staining the epidermis, opening by a minute pore. Spores oblong-oval, 3-septate, yellow, with the basal cell paler, 12–16 × 5–6μ; sporophores hyaline, 20–24 × 1–2μ.

On dead stems of *Epilobium hirsutum*. Cheshire (Ellis). Mar.

A doubtful Hendersonia; ? Coryneopsis.

Fr. Denm.

Equisetum

Hendersonia Equiseti Trail, in Scot. Nat. 1885, viii. 76. Sacc. Syll. x. 329. All. vii. 206.

Pycnidia subepidermal, nearly spherical, about 180μ diam., with a small ostiole. Spores fusoid or nearly cylindrical, rather obtuse at the ends, 3-septate, pale-brown, 12–20 × 2–3μ.

On dead stems of *Equisetum* (? *limosum*). Near Aberdeen (Trail). *n.v.* Feb.

"The pycnidia resemble those of *Sphaeropsis epitricha* B. & Br., which is also found on *Equisetum*, but this latter species has simple spores" (Trail). See Vol. I, pp. 121, 326.

Gramineae

Plurivorous

Hendersonia culmicola Sacc. in Mich. i. 210; Syll. iii. 437. All. vii. 197. Died. 653. Mig. 351.

Pycnidia minute, immersed, then erumpent, frequently in short rows, globose, papillate, black. Spores cylindrical, yellow, 4–5-septate, $28–32 \times 4\mu$.

On culms of many grasses, but varying very much. Common: England; Wales; Scotland.

At Burcot, Bromsgrove, on *Dactylis*, with spores 4–7-septate, somewhat constricted, cylindric-fusoid and curvulous, in company with *Leptosphaeria microscopica*. On *Avena*, spores 6–7-septate. On *Brachypodium* and *Melica*, spores 5–7-septate. On *Spartina Townsendii*, Poole, Dorset, with spores gradually elongating and narrowing, ultimately becoming 7-septate and measuring $40 \times 3\mu$.

Var. **minor**. Sacc. Syll. iii. 437. All. vii. 197. Grove, in Journ. Bot. 1885, p. 163.

Pycnidia globose, blackish, up to 500μ diam., erumpent by a slit. Spores subcylindrical or subfusoid, rounded at the ends, especially above, curvulous, quite hyaline at first, then yellowish, 1-septate, then 3-septate, $15–25 \times 2–3\mu$.

On culms of *Dactylis*, Cheshire (Ellis), spores $12–15 \times 2{\cdot}5\mu$. On *Psamma*, Ayrshire (Boyd). On *Dactylis*, Warwickshire, etc., $15–18 \times 2{\cdot}5–3\mu$. On dead culms of *Poa*, Staffordshire, spores pale-yellowish, $20–26 \times 3{\cdot}5\mu$. On *Phalaris arundinacea*, near the Lizard, spores fusoid, straight, yellow-olive, $12–16 \times 3\mu$.

This species is no doubt the pycnidial stage of *Leptosphaeria microscopica*, which continually occurs with it. It is distinguished from *H. graminicola* Lév. (*q.v.*) by its paler and more slender spores. It has also a var. *intermedia* Sacc. (Fung. Venet. II. no. 322) on *Poa nemoralis* in Germany, with yellowish spores, 4–5-septate, $25 \times 3\mu$.

Fr. Germ. Ital. U.S.A.

Hendersonia culmiseda Sacc. Syll. iii. 437. All. vii. 193. Trail, in Scot. Nat. 1885, ii. 129. *H. culmicola* Cooke, Praecurs. Mon. Henders. 23 (*non* Sacc.).

"Pycnidia gregarious, immersed, dark-brown, up to 300 μ diam.; ostiole scarcely prominent. Spores broadly fusoid, straight or curvulous, 3-septate, fuscous, 14–20 × 5–6 μ." (Fig. 44*b*.)

On dead stems and leaves of *Phragmites communis*. Rescobie, Forfarshire (Trail). Cheshire (Ellis). On *Psamma arenaria*, Harlech (Rhodes). On *Bambusa*, Heythrop Park, Oxon. (Rhodes).

This species has minute pycnidia, often less than 250 μ diam., hardly visible when dry, thinly scattered, subepidermal, blackish, lenticular, showing through the epidermis when moist and at length piercing it by a very minute pore; wall minutely plectenchymatous, olivaceous, subtranslucent, darker round the ostiole. Spores broadly fusoid-oblong, straight or faintly curved, rather obtuse at both ends, 1–3-septate, at times somewhat constricted, olivaceous, paler at lower end, 12–17 × 4–5 μ.

A closely allied form, on old leaves and sheaths of *Phragmites*, Berwick (Johnstone), was named *H. Phragmitis* Desm.; it has minute, globose, papillate pycnidia, arranged somewhat in rows; the spores differ from those of the Forfarshire specimen in being smoky-brown and more lanceolate in shape, 17–18 × 5 μ. In outward appearance the *H. Phragmitis* of Fuckel is identical, but his specimens have spores which are somewhat obovoid, and measure 15–20 × 7 μ. (Fig. 44 *a*.)

These are all possibly forms of the same species, which should be called *Hendersonia Phragmitis* Desm. Cf. *Camarosporium Feurichii*, *infra*, which may be a further development of the same species.

Melica

Hendersonia mollis Grove, in Journ. Bot. 1916, p. 217, pl. 543, f. 4.

Pycnidia arranged in lines between the ribs of the leaf, immersed, globose-depressed, blackish, perforating the epidermis, about 300 μ diam., surrounded by a brownish spot; texture very soft, parenchymatous, pale-ochraceous. Spores cylindric-fusoid, rather obtuse, but sometimes tapering at one end, 38–42 × 4–5 μ, at first hyaline, then guttulate and brownish, at length olivaceous-brown or yellowish, thinly but distinctly 6–7-septate, each loculus having very minute guttules on each side of a septum; sporophores indistinct.

On a sheath of an unknown dead grass (probably *Melica*). Ledbury, Hereford. May.

The fungus is evidently allied to *H. riparia* Sacc., but no distinct long sporophores could be seen, such as Saccardo assigns to that species (20–30 × 2–3 μ).

Phragmites

Hendersonia arundinacea Sacc. in Mich. i. 211; Syll. iii. 436. All. vii. 219. *Sphaeria arundinacea* Desm. in Ann. Sci. Nat. 1846, v. 46–9.

Pycnidia arranged in rows, somewhat compressed, minute, erumpent. Spores fusoid, straight or curvulous, dusky-olive, 3–5-septate, 25–30 × 3·5 μ.

On old culms and sheaths of *Phragmites communis*. Rhosneigr, Anglesey (Rhodes). Scotland. Clare Island, Ireland; etc.

"Spores elongated, subfusiform, clear-brown or olivaceous, straight or flexuous, with 4, 5, or 6 guttules, about 25 × 3·5 μ" (Desm.).

Fr. Belg. Holl.

Hendersonia crastophila Sacc. in Mich. i. 211; Syll. iii. 438. All. vii. 220.

Pycnidia scattered, immersed, then erumpent, subglobose or oblong, papillulate, black, often somewhat hysterioid, about 120 μ diam. Spores linear, rounded above, tapering below, slightly curvulous, at first hyaline, then olivaceous-yellow, 4–7-septate, 25–40 × 3–4 μ. (Fig. 43 *a*.)

On culms, leaves and sheaths of *Phragmites communis*. Broadhaven, Pembr. (Rhodes). Seasalter, near Whitstable; Droitwich Canal. Jul.–Oct.

Spores narrower than those described by Saccardo (5·5 μ), paler (probably younger) and approaching his varieties β and *juncicola*. It is probably the same as the following species. The Whitstable specimens were accompanied by *Microdiplodia* (? *Beckii*).

Ital.

Hendersonia epicalamia Cooke, Praecurs. Mon. Henderson. 19 (1878). *Stagonospora epicalamia* Sacc. Syll. iii. 455 (1884). All. vi. 967.

Pycnidia gregarious, subepidermal, then erumpent and superficial, ± seriate, but not connate, round, lens-shaped, brownish-black, about 150 μ diam., pierced by a minute pore. Spores cylindrical or subfusoid, occasionally bent or flexuous, obtuse at both ends, 3–5-septate, yellowish or pale-brownish, 16–22 (or even 35) × 3–4 μ. (Fig. 43 *b*.)

On leaves and sheaths of *Phragmites communis*. North Wootton (Plowright). Ipsley, Wk. (Rhodes). Polperro (Rilstone). Porth Dafach, Anglesey; Droitwich Canal. Feb.–Oct.

The description is based upon Cooke's original specimen in Herb. Kew; the spores of that specimen are not at all hyaline, as the name given later by Saccardo (who had not seen them) suggested.

Hendersonia graminicola Lév. in Ann. Sci. Nat. 1846, v. 288. Sacc. Syll. iii. 438. All. vii. 220. Mig. 356. (Not *Sphaeria graminicola* Berk. in Ann. Nat. Hist. 1838, i. 20, which is *Septoria graminum* Desm.)

Pycnidia gregarious, immersed, globose, minute; peridium thin, parenchymatous, smoky-brown, darker round the ostiole. Spores elongate-oblong, rounded at the ends, pale smoky-brown, uniform in colour, gently constricted at all the septa, which are three when mature, 17–18 × 5 μ.

On leaves and sheaths of *Phragmites*. No British specimens seen, though the species is recorded, as by Bucknall, v. 5, pl. 2, f. 6, near Bristol.

The description given above is drawn up from the French specimens of Léveillé.

Fr. Switz. Denm. Ital.

Hendersonia leptospora Trail, in Scot. Nat. 1889, iv. 72. Sacc. Syll. x. 328. All. vii. 221.

Pycnidia scattered, immersed, with a short papillate ostiole. Spores clavate-fusoid, pale-brown, 3-septate, eguttulate, 10–13 × 2 μ.

On dead leaves of *Phragmites communis*. Loch Achray (Trail).

Seems to come near to the Indian species *H. minutissima* Sacc., but probably not identical. The species of Hendersonia on *Phragmites* have been much confused.

Heleocharis

Hendersonia norfolcia Sacc. Syll. ii. 73. *Sphaeria norfolcia* Cooke (stylospores), in Grevill. v. 121.

"Pycnidia scattered, minute, covered by the epidermis, which is perforated by the ostiole. Spores oblong, 5-septate, hyaline, 40 × 7·5 μ" (Sacc. *l.c.*).

On culms of *Heleocharis*. North Wootton, with *Leptosphaeria norfolcia* (Cooke). *n.v.*

It would seem that this should rather be placed in *Stagonospora*, and it may be identical with *Stagonospora Heleocharidis* Trail.

Ilex

Hendersonia tarda Grove, in Journ. Bot. 1916, p. 217, pl. 543, f. 5. Sacc. Syll. xxv. 377.

Pycnidia amphigenous, usually epiphyllous, scattered, globose, not papillate, 220–250μ diam., furnished with a pore which just pierces the epidermis; texture plectenchymatous, somewhat olivaceous. Spores narrowly oblong-ellipsoid, when young acute at both ends, then rounded, pale-olivaceous, for a very long time 1-septate, 8–12μ long, when perfectly mature 3-septate, 15–16 $\times$ 2·5μ.

On dead leaves of *Ilex Aquifolium*. Hereford. Feb.

The spores are held together when young in a clear-olive mucilaginous mass, but singly are very pale. At first they are eseptate, then 1-septate, but ultimately a few show two septa and still fewer three septa.

Juncus

Hendersonia juncina J. W. Ellis, in T.B.M.S. 1915, v. 135.

Pycnidia very minute (about 100μ diam.), gregarious, subepidermal, spherical, black, surrounded by flocci. Spores fusoid or cylindrical, narrowed toward each end but with the extreme tips obtuse, 3-septate, pale-ochraceous or dark-yellow, 14–18 $\times$ 3·5–4μ (5–6μ broad, Rhodes).

On rotting culms of *Juncus effusus*, Burton, Cheshire (Ellis). On dead culms of *J. acutus*, Herm, Channel Isles (Rhodes). Feb. Sept.

"Not visible without the aid of a lens, but causing a slight unevenness of the surface. The colour of the spores is faint, but distinct, and the spores are relatively more slender than those of a Stagonospora on the same host" (Ellis), i.e. of *Stagonospora innumerosa* Sacc. (*q.v.* Vol. I, p. 357). An occasional longitudinal septum is seen.

Lonicera, see *Camarosporium*

Luzula

Hendersonia Luzulae Westd. in Bull. Acad. Roy. Belg. ser. 2, vol. ii, no. 7 (1857). Sacc. Syll. x. 328. All. vii. 216. Died. 656. *Stagonospora Luzulae* Sacc. Syll. iii. 451 (1884). Ellis, in T.B.M.S.

1915, v. 135. *Ascochyta teretiuscula* Sacc. & Roum. is a young state of this.

Pycnidia amphigenous, numerous, scattered or arranged in rows, immersed, subglobose or oval, opaque, black, 125–150μ diam., piercing the blackened shining epidermis with the minute ostiole. Spores cylindric, rounded at both ends, generally straight, at first 2–4-guttulate and hyaline, then pale yellow, ultimately brownish, 3-septate, not constricted, $12–15 \times 3–4\mu$.

On withered leaves of *Luzula pilosa, L. silvatica* (= *maxima*). Ayrshire (Boyd). Symond's Yat, Glos. and Eastham Wood, Cheshire. Mar.–May.

Pycnidia scarcely visible with the naked eye; spores for a long time quite colourless, 2·5–3μ wide, full of oily granules, then with 1, 2, or 3 septa and brownish.

Fr. Belg. Germ. Denm. Ital.

Planera

Hendersonia Planerae Cooke & Mass. in Grevill. xvi. 78. Sacc. Syll. x. 323. All. vii. 223.

"Pycnidia scattered, erumpent, subglobose, black, for a long time covered by the cracked cuticle. Spores ellipsoid, rounded at both ends, 3-septate, a little constricted, brown, $30 \times 10–12\mu$."

On twigs of *Planera*. Kew. "Allied to *H. vagans* Fckl." *n.v.*

Rhamnus

Hendersonia mammillana Curr. in Linn. Trans. 1859, xxii. 324, f. 85. Sacc. Syll. iii. 420. All. vii. 229. *Sphaeria mammillana* Fr. Syst. Myc. ii. 487. *H. rhamnicola* Cooke, Praecurs. Mon. Henders. 21. Sacc. Syll. iii. 421.

Pycnidia somewhat scattered, globose-depressed, black, covered by the epidermis which forms a black shield over each. Spores ellipsoid, brown, 3-septate (or with the protoplasm divided into four parts which vary in size), $12–20 \times 9\mu$.

On branchlets of *Rhamnus Frangula*. Hampstead. Jan.

According to some authors an occasional longitudinal septum may be observed. Therefore it is a Camarosporium (?).

Ribes

Hendersonia Grossulariae Oud. in Konink. Acad. Wetensch. Amsterd. 1897, p. 88. Sacc. Syll. xiv. 954. All. vii. 230. *Ascochyta Grossulariae* Oud. Contr. Fl. Myc. Pays-Bas, xvi. 16. Sacc. Syll.

xvi. 936. *Diplodina Oudemansii* All. vi. 694. *Ascochytula Grossulariae* Died. p. 410, p. 350, f. 19.

? *Ascochyta ribesia* Sacc. & Fautr. in Bull. Soc. Myc. Fr. xvi. 22. Sacc. Syll. xvi. 926. All. vii. 879. Died. 394. Mig. 286 (on the leaves).

Pycnidia covered by the epidermis, depressed-globose, membranaceous, black, opening by a small central pore; peridium smoky-brown under the microscope. Spores oblong-fusoid and pale when young, then oblong, obtuse at the ends, 3-septate, olivaceous-brown, $14–17 \times 4–4·5\,\mu$.

On leaves and twigs of *Ribes Grossularia*. Kew Gardens; Tanworth-in-Arden; Evesham, etc. Jan.–Aug.

I find the spores to be pale olivaceous-fuscous, with 0–3 septa, and varying in size, as the septa are successively produced, from $6–7 \times 1·5–2\,\mu$ while continuous, up to $15–23 \times 2·5–3·5\,\mu$ when mature.

Ascochytula Grossulariae Died. is the simplest state; see Vol. I, p. 330. *Diplodina Oudemansii* All., with spores $7–12 \times 2–2·5\,\mu$, can be found mixed up with the larger-spored forms. A few spores could be seen with one or two longitudinal septa; therefore this variable species might ultimately develop into a Camarosporium, though probably not. *A. ribesia* Sacc. & Fautr. may be its leaf-form.

Holl. Germ. Hung. Ital.

Rosa

Hendersonia Rosae Westd. Cinq. Not. in Bull. Acad. Brux. vol. ii. no. 9 (1857). Kickx, Flor. Flandr. i. 389. Sacc. Syll. x. 319. All. vii. 232. Died. 659. Cf. Cooke, Handb. 893, and in Seemann's Journ. Bot. 1866, iv. 109.

Pycnidia usually crowded, but sometimes scattered, 200–$300\,\mu$ diam., globose-depressed, black, papillate, covered by the epidermis, erumpent by a slit or pore. Spores ellipsoid, 3-septate, slightly constricted, brown, $10–12 \times 4–4·5\,\mu$; sporophores very short, straight, soon disappearing.

On branches of *Rosa canina*. Cheshire; Glamorganshire; etc. Feb. Mar.

Diedicke states that the pycnidia are seated on bleached patches of the epidermis. Vestergren describes (Bot. Not. 167; Sacc. Syll. xvi. 944) a var. *Rosae* of *H. vulgaris*, on living leaves of *Rosa*, which seems to be identical with Kickx's species.

Belg. Germ. Denm. U.S.A.

Rubus

Hendersonia Rubi Sacc. Syll. iii. 424. All. vii. 232. Died. p. 659, p. 640, f. 13. *H. sarmentorum* var. *Rubi* Westd. Sacc. in Mich. i. 214.

"Pycnidia scattered or gregarious, globose-depressed, immersed, then erumpent, black, with a small papilla. Spores ellipsoid, 3-septate, smoky-brown, 12–18 × 5–6 μ, with the lowest loculus translucent.

On dead stems of *Rubus fruticosus.* Recorded frequently, as at Hereford; Defford Common; Hartlebury Common; etc.

But there is absolutely no doubt that most of the specimens I have seen, under this name, belong really to Coryneopsis; see *Coryneopsis Rubi* Grove, *infra*, p. 330. The other specimens called *H. Rubi* are only young states of *Camarosporium rubicolum* Sacc. (*q.v.*) where the longitudinal septa have not yet begun to appear. How far a similar statement is equally true about the allied forms on *Rosa* is uncertain.

Fr. Belg. Germ. Denm. Ital. Spain, Siberia.

Hendersonia vulgaris Desm. in Ann. Sci. Nat. 1853, xx. 224. Sacc. Syll. iii. 427. All. vii. 224. Mig. 357. Ellis, in T.B.M.S. 1913, iv. 125.

Pycnidia epiphyllous, minute, depressed-globose, black, shining, sparingly scattered over inconspicuous irregular rusty or grey spots which have a purplish-brown margin. Spores ellipsoid, rounded at the ends, 3-septate, yellowish-brown, about 15 × 6·5 μ.

On fading leaves of *Rubus fruticosus*. Ayrshire (Boyd). Cheshire (Ellis). Aug. Sept.

Surely the leaf-form of the preceding? Abroad this species is recorded also on leaves of *Populus* and *Rosa.*

Fr. Swed. Vosges.

Salix, see *Camarosporium*

Sambucus

Hendersonia Sambuci Müller, *apud* Sacc. in Mich. i. 213. Sacc. Syll. iii. 422. All. vii. 235. Died. p. 660, p. 640, f. 14. Mig. 358. Trail, in Scot. Nat. 1887, iii. 190.

Pycnidia very numerous, gregarious or densely scattered, immersed, then erumpent by the vertex, sometimes becoming superficial, 100–120 μ diam., black; texture of wall membranaceous, of small parenchymatous cells. Spores very copious, fusoid, rarely somewhat curved, tapering and acute at one or both ends, pale-olivaceous, 1–3-septate, slightly constricted at most of the septa, 13–18 × 2·5–3·5 μ, each

loculus often with a large clear vacuole (not an oily globule); no sporophores seen.

On dead (not decorticated) shoots of *Sambucus nigra*. Near Aberdeen (Trail). Whiting Bay, Arran (Boyd). June.

Judging by these specimens, the var. *detecta* Sacc. (*l.c.*) is hardly at all different from the type.

Fr. Belg. Germ. Denm. Ital. Siberia.

Hendersonia pulchella Sacc. in Mich. i. 112 (*non* Myc. Ven.); Syll. iii. 430. All. vii. 236. *H. Saccardiana* Cooke, Praec. Monogr. Henders. 21.

Pycnidia immersed, but somewhat prominent, globose, shortly papillate, black. Spores elongate-fusoid, straight or curvulous, yellowish, then darker in colour, 7–9-septate, about 30×5–$6\,\mu$. (Fig. 44*d*.)

On dead shoots of *Sambucus nigra*. West Kilbride, Ayrshire (Boyd). Sept.

Saccardo and Allescher record vars. of this species on *Galium*, *Humulus*, *Jasminum*, *Lonicera*, *Lychnis*, *Saponaria*, with spores varying in length from 30 to $45\,\mu$ and septa varying in number from nine to eleven.

Fr. Ital.

Saponaria

Hendersonia tenella Schröt. Pilz. Labrad. 19. Sacc. Syll. x. 325. Grove, in Journ. Bot. 1916, p. 218, pl. 543, f. 3.

Pycnidia scattered, subepidermal, globose or oblong, 200–$250\,\mu$ diam., black, surrounded by a few dark-olive creeping fibres, piercing the epidermis with a slit; wall rather soft, thin, parenchymatous. Spores cylindric-fusoid, rounded but tapering slightly at one end or both, at times curvulous, rather pale brownish-olive, 3-septate, 15–25×3–$4{\cdot}5\,\mu$. (Fig. 43*e*.)

On old rotting stems of *Saponaria officinalis*. Hartlebury Common, Worcestershire. May.

Schröter's fungus was on a species of *Alsine*.

Labrador.

Sparganium

Hendersonia Sparganii Niessl, Vorarb. Crypt. Flor. Mähr. 34. Sacc. Syll. iii. 435. All. vii. 239. Trail, in Scot. Nat. 1885, new ser. ii. 129.

Pycnidia minute, scattered, hemispherical, black, immersed or somewhat prominent, papillate, about 180μ diam. Spores fusoid, straight or curved, obtuse at both ends, 3-septate, 13–18 × 2·5–4μ (pale yellow, 13–16 × 2–3μ, Rhodes).

On dead stems of *Sparganium ramosum*. Near Aberdeen (Trail). Defford Common, Ws. (Rhodes). Mar.–Jun.

The colour of the spores was not given by Niessl, so that Saccardo thought the species might be a Stagonospora, but it certainly seems different from *St. Sparganii* (*q.v.* in Vol. I, p. 361). Is it the pycnidial stage of *Leptosphaeria clara*?

Moravia.

Symphoricarpus, see *Cornus*

Tamarix

Hendersonia Tamaricis Cooke, in Grevill. xiv. 5, *p.p.* Sacc. Syll. x. 318. All. vii. 241. (*Non* Mig. p. 359, pl. 45, f. 4–8.)

"Pycnidia loosely gregarious, covered by the elevated epidermis, subglobose, scarcely papillate. Spores ellipsoid, slightly attenuated toward both ends, 3-septate, not constricted, pale-brown, 18–20 × 7μ."

On branches of *Tamarix gallica*. Kew Gardens (Cooke). *n.v.*

It is possible that there may be such a species as Cooke describes, but the specimens I have seen with his name are melanconiaceous and belong to Coryneopsis, *q.v. infra* (p. 331). See Journ. Bot. 1932, p. 35, pl. 599, f. 4.

Tilia, see *Camarosporium*

Valeriana

Hendersonia Valerianae Henn. in Sach. ges. Sphaer. 1904, p. 433. Sacc. Syll. xviii. 363. Mig. 360.

Pycnidia subgregarious, immersed, then erumpent, black, depressed, 80–100μ broad; texture submembranaceous. Spores oblong or subfusoid, occasionally clavulate, obtuse at both ends or subacute at base, 1–3-septate, not constricted, olivaceous-yellow, 11–17 × 3·5–4·5μ. (Fig. 44*d*.)

On dead stems of *Centranthus ruber*, on the walls of the Castle, Pembroke (Rhodes). Aug.

Saxony.

WOINOWICIA Sacc. Syll. x. 328; xiv. 960.

Pycnidia similar to those of Hendersonia, except that they are sparsely clothed with brownish hairs. Spores also similar.

Triticum

Woinowicia hirta Sacc. Syll. *ll. cc.* All. vii. 250. *Hendersonia hirta* Schröt. in Hedwig. 1890, p. 61 (*non* Curr. Simpl. Sphaer. p. 324). *Woinowicia graminis* Sacc. & D. Sacc. Syll. xviii. 367 (1906). *Hendersonia graminis* McAlpine, in Dept. Agric. Victoria, Bull. no. 9, 1904, p. 9, f. 19–21.

Pycnidia punctiform, black, erumpent, globose, 240–360μ diam., membranaceo-carbonaceous, parenchymatous, rostellate, clothed with simple fuliginous septate hyphae, principally around the 200μ long rostellum. Spores dark-brown in mass, singly olivaceous, fusoid, straight or curvulous, acute or somewhat obtuse, 7-septate, not constricted, 32–38 × 4–5μ (24–28 × 3–4μ, Sacc.).

On stems of *Triticum*, including seedlings. Reading; Whitchurch, Hampshire (Buddin). *n.v.*

Woinowic's record was on *Setaria verticillate* at Belgrade. Serbia, Australia.

HENDERSONIELLA Sacc. Syll. iii. 441 (as subgenus).

Having pycnidia and spores similar to those of Hendersonia, but growing upon wood and more or less superficial; wall rather thick.

Plurivorous

Hendersoniella trabicola Sacc. Syll. iii. 441. All. vii. 934. Died. 664.

Pycnidia gregarious, erumpent, globose, obtuse, black, rather thick-walled, furnished with an indistinct pore. Spores oblong, obtuse at both ends, sometimes bent, 3-septate, fuscous-brown, 12–14 × 4μ.

On decorticated wood of *Magnolia* and *Aloysia citriodora*. Lansallos, Cornwall (Rilstone). Mar.

The pycnidial stage of *Strickeria* (*Teichospora*) *trabicola* Wint. Germ.

Quercus

Hendersoniella quercina All. vii. 934 (1903). *Hendersonia quercina* Sacc. in Mich. i. 213 (1878); Syll. iii. 441; Fung. Ital. pl. 1477. Mig. 356. All. vii. 227, with fig.

Pycnidia more than half immersed in the wood, subgregarious, globose, up to 500μ diam., black; wall thick and carbonaceous. Spores cylindric-ellipsoid, obtuse at both ends, straight or rarely bent or curved, 16–18 × 4μ, at first continuous, olivaceous-fuscous, guttulate, then becoming darker, 1–3-septate, not constricted, at last almost opaque.

On a dead branch of *Quercus*, which had lost its bark. Sneyd's Coppice, Worcs. May.

I assign these specimens to *H. quercina* rather than to *H. trabicola* (spores 14 × 4μ), but probably they are identical species, since *H. trabicola* is recorded by Fuckel on *Quercus*, also.

Ital.

Salix

Hendersoniella viminis, comb. nov. *Hendersonia quercina* (Sacc. Syll. iii. 441), var. *viminis* Roll. & Fautr. in Rev. Mycol. 1894, p. 73, pl. 141, f. 6. Sacc. Syll. xi. 530. All. vii. 228, with fig.

Pycnidia very small, loosely aggregated, superficial, "membranaceous", papillate. Spores cylindric or tending to be obconical (i.e. broader and rounded at the apex), of a clear yellow, lightly tinged with smoky-green, 3-septate, not or hardly constricted, straight or faintly curved, 16–20 × 3–4μ.

On old decorticated twigs of *Salix*, forming a hamper. Forden (Vize).

It was found in France on old decorticated osiers. In Vize's specimen the spores measure 15–16 × 4–5μ, and the pycnidial wall is too thick to be called "membranaceous".

Fr.

PROSTHEMIUM Kunze, in Myk. Heft. i. 17.

Pycnidia immersed, globose-depressed, carbonaceous, black, opening by a pore. Spores ± oblong-fusoid, pluriseptate, brownish-olivaceous, united several together at the base to form a head in which they are radiantly arranged, supported on a filiform pedicel about as long as the spores.

The genus is as it were a Stilbospora (modified) enclosed in a pycnidium.

Alnus

Prosthemium stellare Riess, in Bot. Zeit. 1853, p. 130, pl. 3, f. 28–31. Sacc. Syll. iii. 445. Cooke, Handb. p. 460, f. 173. B. & Br. in Ann. Nat. Hist. 1861, vii. 380, pl. 15, f. 10. All. vii. 255, with fig. Died. p. 666, p. 640, f. 20. Mig. p. 362, pl. 46, f. 7–10.

Pycnidia immersed, globose-depressed, black, pierced by a pore. Spores cylindric-fusoid, fuliginous, paler at the apex, 3–4-septate, 26–28 × 5–6μ, united at the base 12–20 together in a radiating head which is supported on a slender pedicel about as long as the spores, at length issuing as a tendril. (Fig. 45*a*.)

On bark of dead branches of *Alnus glutinosa*. Spye Park, Wiltshire (Broome). Norfolk (Plowright). Scotland.

The pycnidial stage of *Pleomassaria holoschista* Tul. Carp. ii. 234.

Germ.

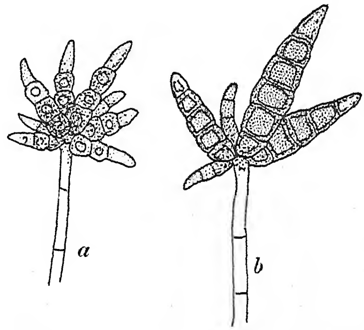

Fig. 45. *Prosthemium*: *a*, *P. stellare*; *b*, *P. betulinum*; spore-heads, ×600.

Betula

Prosthemium betulinum Kunze, Myk. Heft. i. 17, pl. 1, f. 10. Corda, Ic. iii. 24, pl. 4, f. 67. Sacc. Syll. iii. 444. Cooke, Handb. 844. Curr. Phil. Trans. cxlvii. 552, pl. 26, f. 30, 31. All. vii. 255, with fig. Died. p. 666, p. 640, f. 19. Mig. p. 362, pl. 46, f. 3–6.

Pycnidia rather scattered, nestling in the bark, lens-shaped, black, opening by a pore. Spores obclavate, pale-fuliginous with the terminal cell nearly colourless, 3–5-septate, 40–55 × 13–16μ, each coloured loculus with a paler centre, united at the base 2–5 together (some immature) in a head supported on a filiform pedicel about as long as a spore and 3–6μ thick; paraphyses numerous. (Fig. 45*b*.)

On bark of *Betula alba*. Milton, Northamptonshire (Berk.). Blackheath (Cooke). Wiltshire (Broome).

The pycnidial stage of *Pleomassaria siparia* Tul. Carp. ii. 232.
Fr. Belg. Germ. Ital.

DICTYOSPORAE

Spores dark-coloured, and provided with longitudinal as well as with transverse septa.

I. Pycnidia immersed.

A. Pycnidia separate, without any conspicuous stroma of their own.

1. Spores with few longitudinal septa . . . *Camarosporium*
2. Spores highly clathrato-muriform . . *Camarographium*

B. Pycnidia united and sunk in a stroma . . . *Dichomera*

II. Pycnidia quite superficial . . . . *Cytosporium*

CAMAROSPORIUM Schulz. Myc. Beitr. 1870, p. 649.

Pycnidia immersed, erumpent, separate or clustered, subglobose, often papillate, thick- or thin-walled; wall of small dark-brown cells, gradually becoming paler inwards, if thick. Spores brown, olive-brown, or fuliginous-brown, with one or more transverse or, it may be, oblique septa, and with one or more of the loculi divided longitudinally by a septum or even two, i.e. not strictly muriform in the way typical of Pleospora, but approaching that state.

When young, many species of this genus may be and have been mistaken for a Hendersonia, since most of the spores are for a time devoid of the longitudinal septa which can be found by a more prolonged search. It can be distinguished from Dichomera solely by the absence of a stroma.

Plurivorous

Camarosporium ambiens, comb. nov. *Hendersonia ambiens* Cooke, in Grevill. xiv. 5. Sacc. Syll. x. 318. All. vii. 192. *H. sarmentorum,* var. *Aceris-campestris* Sacc. Syll. iii. 420.

Pycnidia gregarious, covered by the elevated epidermis which is at length torn or perforated, globose, shortly papillate; wall thick, but rather soft. Spores narrowly ellipsoid, mostly 3-septate, not constricted, clear-brown, $16–18 \times 5–6 \mu$, then 4–6-septate, with a few longitudinal septa, and measuring

7–8μ wide and up to 25μ long; sporophores at first of equal length, but soon vanishing.

On twigs of *Acer dasycarpum*, Kew Gardens (Cooke). Of *Acer campestre*, Iccomb, Glos. (Rhodes); Shinfield, Berks. (Wakefield). On dead twigs of *Fagus*, Ayrshire (Boyd).

Apr.–Jul.

The spores elongate and remain pale and continuous up to 14μ long. On the same twigs at Kew and Ayrshire were forms of *Cytospora ambiens* and *Valsa ambiens*, while on those at Iccomb were *Diplodia subtecta* and *Microdiplodia subtecta*, and on those at Shinfield *Diplodia atrata*.

Camarosporium propinquum Sacc. Syll. iii. 464. All. vii. 283. Died. p. 682, p. 640, f. 36. *Hendersonia propinqua* Sacc. in Mich. i. 516.

Pycnidia gregarious, raising the epidermis conically and bursting it, depressed-globose, papillate, with thick walls, paler inwards, up to 350μ diam., black. Spores at first hyaline, then fuliginous and 3-septate, with the two central loculi longitudinally divided, not constricted, 15–18 × 6–8μ; sporophores short and thick.

On *Corylus*, Berkshire (Buddin). On *Populus canadensis*, Freshfield, Cheshire (Ellis). May.

Fr. Germ.

Artemisia

Camarosporium aequivocum Sacc. Syll. iii. 467. All. vii. 260, 291. Died. p. 669, p. 640, f. 28. Mig. 364. *Dichomera aequivoca* Pass. Erb. critt. Ital. ser. II, no. 1391.

Pycnidia solitary or arranged in rows, at first covered, then bursting the epidermis and becoming superficial, depressed-globose, up to 300μ diam., opening by a broad pore; wall

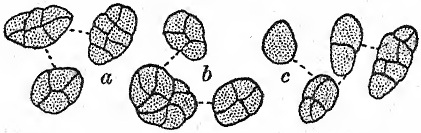

Fig. 46. *Camarosporium*: *a*, *C. aequivocum*, f. *Absinthii*; *b*, *C. Kriegeri*; *c*, *C. Obiones*; spores, all × 600.

brown outside, paler within. Spores numerous, globose-oval, clear-brown or fuscous, with one or two transverse septa and

one or several longitudinal ones, often with the septa placed more or less radially, 9–14 × 7–9 μ; sporophores unseen.

Forma **Absinthii,** f. nov.

Septa often radial. Spores reaching up to 18–20 × 10–12 μ. On dry stems of *Artemisia Absinthium.* Waste ground at Shirley Aqueduct, near Birmingham. (Fig. 46*a*.) May.

The type, which was on other species of *Artemisia,* is the pycnidial stage of *Leptosphaeria caespitosa* Niessl, but has not yet been found in Britain.

Germ. Ital. Latvia.

Atriplex

Camarosporium Obiones Jaap, in Verh. Bot. Ver. Brand. 1905, p. 97. Sacc. Syll. xxii. 1082. Mig. 368.

Pycnidia rather scattered, immersed, lenticular, up to 200 μ diam.; wall thin, parenchymatous, ochraceous-brown, darker round the pore. Spores exceedingly varied in shape, oblong, ovoid, pyriform, or quadrate, with 3 (or 4, Jaap) transverse septa when mature, and then muriform, but when young roundish, 10–12 μ diam. and sometimes 1-septate or cruciately septate, at length measuring 18–20 × 8–11 μ, ochraceous olive-brown; septa thin and frequently indistinct; sporophores filiform, simple, 20–40 × 2 μ (up to 70 μ, Jaap). (Fig. 46*c*.)

On dead stems of *Obione portulacoides.* Chesil Beach, Dorset (Rhodes). On *Atriplex Halimus,* Polperro (Rilstone & Rhodes). Apr.–Jul.

Von Höhnel assigns this to his *Thyrococcum punctiforme* (see Fragm. Myk. no. 718). It is not a good Camarosporium.

Germ.

Berberis

Camarosporium Berberidis Cooke, in Grevill. xiii. 97. Sacc. Syll. x. 341. All. vii. 261.

Pycnidia gregarious, covered by the slightly elevated epidermis, small, 300–500 μ diam., subglobose, "with the habit of a *Phoma.*" Spores variable in size, at first pale and 1-septate, ellipsoid, not constricted, at length 3-septate, not or faintly constricted at each septum, with the two central loculi often longitudinally divided, clear-brown, 22–25 × 6–9 μ when mature.

On small twigs of *Berberis vulgaris*. Kew Gardens. Mar.

I find the young spores to measure 13–14 × 5–6 μ, the older ones mostly 18–20 × 8 μ; not infrequently there are four transverse septa, or even occasionally five. Doubtless *C. berberidicola* Delacr. (Sacc. Syll. x. 341) is merely the younger form of this.

Fr.

Cistus

Camarosporium cistinum Cooke, in Grevill. xiv. 5. Sacc. Syll. x. 338. All. vii. 263.

Pycnidia gregarious, seated on the inner bark, globose, 0·5–1 mm. diam., with a conical ostiole which perforates the covering layer of bark, sometimes forming irregular lines, black. Spores ellipsoid, elongated, 3-septate, not constricted at the septa, with sometimes (but not constantly) one of the central cells longitudinally divided, brown, 15–18 × 5–7 μ.

On branches of *Cistus laurifolius*. Kew Gardens (Cooke). May.

Citrus

Camarosporium Limoniae Cooke, in Grevill. xiii. 97. Sacc. Syll. x. 340. All. vii. 263.

Pycnidia gregarious, covered by the elevated epidermis, which is ultimately cleft, depressed, scarcely papillate, brown. Spores ellipsoid, rounded at the ends, 3-septate, sometimes (but rarely) with one cell longitudinally divided, scarcely constricted, becoming of a clear nut-brown colour, 22–28 × 7–9 μ; sporophores short.

On twigs and spines of *Citrus trifoliata*. Kew Gardens (Cooke).

Coniferae

Camarosporium Pini Sacc. Syll. iii. 465. All. vii. 259. Died. 667. Mig. 369. *Hendersonia Pini* Westd. in Bull. Acad. Belg. ser. 2, vol. ii, no. 7.

Var. **conorum** Grove, in Journ. Bot. 1922, p. 81.

Pycnidia rather crowded, up to 500 μ diam., very convex, roundish or elongated, black, covered by the epidermis, then bursting it irregularly or by a slit; texture thick and dark, indistinct, paler inwards. Spores oblong, rounded at both ends, often slightly curved, at first continuous, at length 3-septate, not or hardly constricted, the central cells finally

with one or two longitudinal divisions, 15–18 × 7–8 μ, cells uniformly brown, the central cells often shorter than the terminal ones; sporophores short and indistinct.

On cone-scales of *Picea excelsa*: Hereford; Malvern. On cone-scales of *Pinus silvestris*, Hartlebury Common, Ws. (Rhodes), f. *major* Grove, with spores 22–23 μ long, or even over 35 μ. May.

The spores vary in size and colour, with all possible transitional forms, from small hyaline ones exactly like those of *Phoma strobiligena* Desm. through septate and brownish ones like those of *Diplodia* and *Hendersonia*, one or two of the loculi of the latter becoming ultimately divided by a longitudinal septum. But some of the largest ones could be found deeply coloured without a trace of any septum. For *Camarographium Abietis*, see p. 107.

Belg. Germ.

Cytisus

Camarosporium Laburni S. & Roum. in Mich. ii. 630; Syll. iii. 460. All. vii. 266. Died. 673. See T.B.M.S. 1932, p. 293. *Hendersonia Laburni* Westd. Not. 5, Quelq. Hyp. Belg. p. 13, f. 2. *Camarosporium laburnicum* Sacc. Syll. x. 339; All. vii. 265 (a later stage).

Pycnidia erumpent, but not much projecting, in little groups of two or three, rarely more, globose, up to 1 mm. wide, papillate, black. Spores oblong-ellipsoid, rounded at both ends, usually with three transverse septa, occasionally with four or five, one or more of the loculi at length longitudinally divided, brown, not constricted, 16–20 × 8–9 μ, rarely as much as 30 μ long; sporophores inconspicuous. (Fig. 47.)

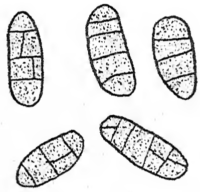

Fig. 47. *Camarosporium Laburni*: spores, × 600.

On dead or dying branches of *Cytisus Laburnum*. England, Scotland. Not uncommon.

A pycnidial stage of *Cucurbitaria Laburni* de Not., amidst which it can regularly be found. The spores are at first hyaline, then 1-septate, then brownish and 3-septate, afterwards as stated above. Saccardo's description of *C. laburnicum* gives the spores as 7–9-septate and distinctly muriform, 30–32 × 9–10 μ, but it is no doubt merely an advanced state of the same species; possibly the same is true of *C. Cytisi* Berl. & Bres. Microm. Trident. p. 74, pl. 6, f. 8 (All. vii. 266, with fig.), which is a more crowded botryose form, with spores having 4–7 transverse septa and one or almost all of the loculi longitudinally divided. *Dichomera Laburni* Cooke & Mass. (*q.v.*) has

a more definite stroma, but is otherwise alike; no doubt the stroma belongs to the accompanying pyrenomycete.

Tulasne (Carp. ii. 215, pl. 27, f. 6–19), and Miss Mary Green (in T.B.M.S. 1932, xvi. 292–3) give various forms of pycnospores belonging to the Cucurbitaria, and Saccardo (Syll. ii. 308) names among them *Diplodia Cytisi* as well as "*Hendersonia Laburni*", which latter, however, is only the incompletely developed Camarosporium. *Phomopsis rudis* is a distinct fungus.

Fr. Belg. Germ. Denm. Ital. Russ.

Elaeagnus

Camarosporium Elaeagni Grove. *Hendersonia Tamaricis,* var. *Elaeagni* Cooke, in Grevill. xiv. 5.

Pycnidia rather small, densely gregarious. Spores ovoid, then ellipsoid, slightly attenuated toward one or both ends, eseptate, then 1-septate, at length 3-septate and pale-brown, not constricted, occasionally furnished with a longitudinal septum, 12–17(–20) × 7 μ; sporophores evanescent.

On branches of *Elaeagnus angustifolius.* Kew Gardens (Cooke), in company with *Diplodia Elaeagni* Pass.

In some of the original specimens I could find only what appeared to be *Phoma elaeagnella* Cooke (which is a Coniothyrium) and also *Phomopsis cladophila* Pass. (Syll. x. 145) which is no doubt the same fungus as *Phomopsis Elaeagni* (Sacc.) on the leaves of that host (see Sacc. Syll. iii. 114). On others Cooke's "Hendersonia" occurred, but, since *H. Tamaricis* Cooke seems not to exist, it cannot be called a variety thereof.

Ephedra

Camarosporium Ephedrae Cooke & Mass. in Grevill. xvi. 9. Sacc. Syll. x. 345. All. vii. 267.

Pycnidia scattered, subepidermal, at length erumpent with the upper half exposed, subglobose, black, pierced at the apex. Spores ellipsoid, 3-septate, with one or two of the loculi longitudinally divided, brown, 20 × 8–10 μ.

On twigs of *Ephedra andina.* Kew Gardens. May.

On the original specimens, supposed to represent this species at Kew, I can find now no trace of a *Camarosporium;* but there are a number of pustules of *Trullula olivascens* Sacc. (*q.v.* p. 266).

Euonymus

Camarosporium Euonymi Bres. in Rev. Mycol. 1891, p. 29, pl. 114, f. 7. Sacc. Syll. x. 342. All. vii. 267, with fig.

Pycnidia gregarious, very minute, immersed, globose-depressed, black, with a scarcely projecting ostiole; texture

parenchymatous. Spores oblong-ovoid, 3-septate, slightly constricted at the septa, afterwards once or twice longitudinally divided, 18–20 × 10μ; sporophores short.

On branches of *Euonymus europaeus*. Park Attwood, Kidderminster (Rhodes), with *Phomopsis ramealis* Died. June.

Hungary.

Ficus

Camarosporium Ficus, sp. nov.

Pycnidia scattered or rarely subgregarious, subglobose, black, immersed, then erumpent by the pierced vertex, 200–250μ diam. Spores oblong, very obtuse at both ends, continuous, then 1-septate, at length 3-septate, brown, assuming a faint fuliginous tinge but not opaque, rarely constricted, 12–20(–24) × 5·5–6μ; ultimately one of the central loculi is longitudinally divided; no sporophores seen.

On branches of *Ficus Carica*. Kidderminster (Rhodes). June.

The spores of this fungus were extraordinarily diversified. In the same pycnidium could be seen spores of every form—continuous and then hyaline or coloured, 9–12 × 5–6μ; 1-septate, 14 × 6, mostly coloured; then with two or three septa; and occasionally with one of the intermediate loculi divided by a longitudinal division. The 3-septate spores mostly (but not always) predominated. Moreover, the Fusarium spores (*F. Urticearum* Sacc.), which not infrequently accompany *Phomopsis cinerascens* on this host, also accompanied this fungus. They are intruders on the dying Camarosporium.—At a certain stage of its growth, this fungus might easily have been mistaken for a Microdiplodia.

Fraxinus

Camarosporium Orni Henn. in Hedwig. 1903, p. 221. Sacc. Syll. xviii. 372. Died. p. 674, p. 640, f. 35. Mig. 366.

Pycnidia immersed in the bark, projecting only by the vertex, subglobose, papillate, somewhat locellate within, 300–500μ diam.; wall thick, formed of minute indistinct cells. Spores ellipsoid, obtuse at both ends, 3-septate, with one or both of the median cells divided longitudinally, fuscous-brown, 10–18 × 5–6μ.

On dead branches of *Fraxinus excelsior*. Edgbaston, Birmingham (Rhodes).

Cf. *Cytosporium Melanomma*, *infra*, p. 112.

Germ. Canada.

Ilex

Camarosporium Ilicis Oud. Contr. Flor. Myc. Pays-Bas, xvi. 74. Sacc. Syll. xvi. 952. All. vii. 937. Died. 675. Ellis, in T.B.M.S. v. 136.

Pycnidia scattered, membranaceous, lens-shaped, up to 500μ diam., covered by the bark which is blackened above it and becomes pallid around the prominent pierced apex. Spores ellipsoid, at first greyish-olive, at length fuscous, 3-septate, 14–16 × 7μ, then elongating and acquiring 4–6 septa, rounded at the ends, the intermediate loculi frequently divided by an oblique or longitudinal septum.

On dead branches of *Ilex Aquifolium*. Bromborough and Eastham Wood, Cheshire (Ellis). Staines, Middlesex; Quinton, Ws. Jan.–Mar.

? Not a more advanced state of *Diplodia ilicicola*, which occurred with it at Staines.

Holl. Germ.

Laurus

Camarosporium Lauri Grove. *C. Coronillae*, var. *Lauri* Sacc. in Mich. i. 516; Syll. iii. 460. All. vii. 264. Mig. 365. *Hendersonia sarmentorum*, var. *Lauri* Cooke, in Grevill. xiii. 97.

Pycnidia gregarious, for a long time immersed, then erumpent, dark-olivaceous. Spores oblong-ovoid, rounded at both ends, 3-septate, somewhat constricted, with one or two of the loculi longitudinally divided, smoky-olivaceous, 16–21 × 6–8μ.

On twigs of *Laurus nobilis*. Kew Gardens (Cooke). Salford Priors, Wk. (Rhodes).

The spores can be seen, in these specimens, in all possible states—faintly coloured and continuous or 1-septate in the middle, then 3-septate, and finally with one or two longitudinal septa also. As they pass through these states they grow longer and darker.

Fr. Germ. Denm.

Lonicera

Camarosporium Caprifolii Brun. Champ. Saint. 1887, p. 430. Sacc. Syll. x. 343. All. vii. 271. *Hendersonia Lonicerae* Cooke, in Grevill. xiv. 65. *Phoma Xylostei* Cooke & Harkn. in Grevill. ix. 82.

Pycnidia gregarious or arranged ± longitudinally, round or oblong, covered, then erumpent, compressed, blackish, shining, opening by a pore, about 250μ long; texture soft.

Spores ellipsoid, rounded at both ends or somewhat tapering below and therefore subclavate, 3-septate, then with one or both of the middle loculi divided (obliquely or longitudinally), not constricted, at first uniformly pale yellow-brown, then darker, 12–16(–20) × 5–6 μ; sporophores subulate, about as long as the spore.

On living or dead twigs of *Lonicera* (*Caprifolium*, *Xylosteum*). Kew Gardens; Dunhampstead, Ws.; Ockeridge Wood; Red Wharf Bay, Anglesey; etc. Apr.–Jun.

The spores will be found passing through all the usual stages in the same pycnidium—continuous, 1-septate, 3-septate, muriform. I have similar specimens from California on *L. hispidula*. Whether this is *H. Lonicerae* Fr., as well as of Cooke, is uncertain; the colour of Fries' spores was not described. Cf. *C. Xylostei* Sacc. *infra*.

Fr. Belg. Swed. U.S.A.

Camarosporium Xylostei Sacc. Syll. iii. 461. All. vii. 271. Died. 676. Mig. 367.

Pycnidia scattered, nestling in the cortex underneath the epidermis, at length nearly free, conico-globose, with a minute papilla, black, up to 500 μ diam. Spores oblong-ovoid, attenuated towards each end, but obtuse at the tip, 3-septate or even 5-septate, at length furnished with one or two longitudinal septa, slightly constricted, fuscous-brown, 18–20 × 8–10 μ; sporophores linear, short, soon disappearing.

On dead stems of *Lonicera Xylosteum*. Hartlebury Common (Rhodes).

Stated by Fuckel to be the pycnidial stage of his *Didymosphaeria Xylostei* (*Anthostoma Xylostei* Sacc.). But the Hartlebury specimen does not seem to be really different from *C. Caprifolii* Brun. except that the spores are larger.

Germ.

Magnolia

Camarosporium Magnoliae, sp. nov.

Pycnidia numerous, scattered, but rather densely, up to 400 μ broad, erumpent, convex, black. Spores oblong, 1–4-septate, with an occasional longitudinal septum, dark-brown, not constricted, 10–16 × 4–6 μ.

On leaves of *Magnolia grandiflora*, especially on the midribs. Hadzor Hall, Ws. (Grove & Rhodes). Oct.

Morus

Camarosporium Mori Sacc. Syll. iii. 464; Fung. Ital. pl. 1483. All. vii. 273, with fig. *Hendersonia Mori* Sacc. in Mich. i. 208.

Pycnidia gregarious or aggregated in heaps, erumpent, globular, shortly papillate, deep-black; texture parenchymatous, fuscous. Spores oblong-ovoid, sometimes unequal, 1-septate, then 3–5-septate and muriform, not or slightly constricted, at first hyaline, then dull smoky-olive, $10 \times 5\mu$ when young, then $12–15 \times 6–7\mu$, finally $20–22 \times 8–10\mu$.

On twigs of *Morus alba*. Kew Gardens.

There can be little doubt that *C. Passerinii* Sacc. Syll. x. 344 (All. vii. 273; Died. p. 677, p. 640, f. 24; Mig. 368) is a less advanced state of this species, with spores $10–15 \times 5–6\mu$.

Holl. Germ. Denm. Austr. Hung. Ital.

Obione, see *Atriplex*

Philadelphus

Camarosporium macrosporum Sacc. Syll. iii. 461. All. vii. 276. Died. 678. Mig. 369. *Hendersonia macrospora* B. & Br. in Ann. Nat. Hist. 1850, v. 373. Cooke, Handb. 434. *H. pulchella* Sacc. *olim.*

Pycnidia loosely gregarious, completely concealed by the epidermis which is very slightly raised, black, globose-hemispherical, somewhat papillate, up to 500μ diam. Spores narrowly fusoid-lanceolate, straight, with at first one, then four or five septa (5–6, Berk.), slightly constricted, with a few longitudinal septa, yellowish-brown, $18–20 \times 6–7\mu$; sporophores indistinct.

On dead twigs of *Philadelphus coronarius*. Apethorpe, Northamptonshire (Berk.). Ayrshire (Boyd). Fife; Inverness (Trail). Sept. Oct.

Distinguished by its concealed habit and long fusoid spores.

Fr. Belg. Holl. Germ. Austr. Ital. Swed.

Phragmites

Camarosporium Feurichii Henn. Ein. in Sachs. ges. Sphaer. 1904, p. 433. Sacc. Syll. xviii. 375. Mig. 369.

Pycnidia gregarious, covered by the epidermis, then erumpent, subglobose, black, pierced by a pore, $100–150\mu$ diam. Spores elongate-ellipsoid, subfusoid, ovoid, or clavate, obtuse at both ends, 3-septate, scarcely constricted, at length

with one (or rarely two) longitudinal divisions, chestnut-brown or fuscous, 10–16 × 4–6 μ. (Fig. 49*c*.)

On stems of *Phragmites communis*. Broomhill Burrows, Pembr. (Rhodes). May, Oct.

Spores as usual continuous, 1-septate, 3-septate, even 4-septate, and finally muriform. Possibly a more developed state of *Hendersonia Phragmitis* Desm. or *H. culmiseda* Sacc.; it was accompanied by *Lophodermium arundinaceum*.

Forma **major** Grove.

On the leaves of the same host, at Droitwich in the Canal, I found a larger form, with darker spores 18–22 × 5–6 μ, which developed more transverse septa (up to seven) but still had only one (or rarely two) longitudinal divisions. (Fig. 49 *b*.)

Germ.

Pyrus

Camarosporium Karstenii S. & Syd. in Syll. xiv. 966. *C. multiforme* Karst. Sphaerops. Fenn. 31 (*non* Sacc. & Sch.).

Pycnidia gregarious, roundish or oblong, convex, black, mouthless, 300–350 μ diam. Spores cylindric-ellipsoid or oval-oblong, variable, 3–5-septate, hardly constricted, with a single loculus longitudinally divided, yellowish, then clear-brown, 15–20 × 8–10 μ.

In bark of small branches of *Pyrus Malus* (Cox's Orange). Reading (Buddin). Dec.

Karsten's original specimens were on decorticated branches, and the bases of the pycnidia were sunk in the wood.

Finland.

Quercus

Camarosporium Oreades Sacc. Syll. iii. 466. All. vii. 279. *Hendersonia Oreades* D. & M. Flor. Alger. 571. Cooke, Handb. 435. *Dichomera Oreades* Cooke, Praecurs. Mon. Henders. 24.

Spots amphigenous, round, flattened, dry, elevated, greyish-yellow. Pycnidia gregarious or circinate, immersed, minute, black, globose, mouthless, white within. Spores ovoid or somewhat oblong, with 1, 2, or 3 transverse septa, and an occasional longitudinal one, dark smoky-brown, almost opaque, 8–10 × 5–8 μ; sporophores short.

On half-dead leaves of *Quercus pedunculata*. Forres; Hornstock (Berkeley). New Pitsligo (Fergusson). Sept.

Fr. Belg. Tyrol.

Camarosporium Quercus Sacc. & Roum. Rel. Libert. IV, no. 142, pl. 42, f. 8; Syll. iii. 464. All. vii. 278, with fig. Mig. p. 370, pl. 47, f. 4–6.

Pycnidia somewhat caespitose, erumpent, globose, obtusely papillate, black, about 300μ diam. Spores oblong, rounded at both ends, 5-septate and muriform, not constricted, smoky-brown, 25–28 × 8–10μ; sporophores filiform, very short.

On bark of twigs of *Quercus coccinea*. Kew Gardens (Cooke). Apr.

"Probably the pycnidium of *Otthia Quercus* Fckl." (Sacc.).
Ardennes.

Ribes

Camarosporium Ribis Sacc. Bomm. & Rouss. Contr. Myc. Belg. iv. 86. Sacc. Syll. x. 341.

Pycnidia scattered, globose, 500–750μ diam., black, papillate, perforating the epidermis and surrounded by it. Spores ovoid-oblong, obtuse, mostly 3-septate, surrounded by a thin hyaline stratum, at length with one or two longitudinal septa, 15–18 × 7·5–10μ.

On dead twigs of *Ribes Grossularia*. Kidderminster (Rhodes). June.

This fungus has much smaller spores than *C. Grossulariae* Bri. & Har. in Rev. Myc. 1889, p. 16, but it does not seem to differ from *C. Ribis* Briard, Fl. Crypt. Aube, p. 402 (Sacc. Syll. *l.c.*) which was found on a rotting stem of *Ribes rubrum* in France, with spores 3–5-septate measuring 20–22 × 7–9μ. All possible stages of the spores, ovoid and continuous, 1-septate, 3-septate, muriform, could be found in a single pycnidium of Dr Rhodes' fungus.

Belg. Fr.

Robinia

Camarosporium Robiniae Sacc. Syll. iii. 459. All. vii. 280. Died. 681. Mig. 371. *Hendersonia Robiniae* Westd. Crypt. Class. 375.

Pycnidia immersed in the bark, at first scattered, then arranged in lines, up to 700μ diam., subglobose, brown, perforating the epidermis; ostiole subpapilliform. Spores elongate-oval, brown, 3–6 (or even 8)-septate and muriform, not constricted, 15–25 × 7–9μ; sporophores indistinct.

On dead branches of *Robinia Pseudacacia*. Swanscombe (Cooke). West Kilbride, Ayrshire (Boyd).

The pycnidial stage of *Cucurbitaria elongata* Grev. *C. subfenestratum* (B. & C.) Sacc. *l.c.* is the same species, and I think *C. Pseudacaciae* Brun. (Died. p. 681, p. 640, f. 37) is a more advanced substromatic state. See also *Diplodia profusa, supra*, p. 56.

Europe, N. and S. America.

Rosa

Camarosporium Rosae Grove. Not *Cam. Rosarum* Sacc. Syll. iii. 462.

Pycnidia densely scattered, globose, papillate, small (about 120μ diam.), black, covered, then protruding the papilla through a torn fissure. Spores oblong, obtusely rounded at both ends, 3-septate (or occasionally 4–5-septate) with one or rarely two longitudinal divisions, equally dark-brown throughout, hardly constricted, 16–20 × 5·5–6μ; sporophores not seen. (Fig. 48.)

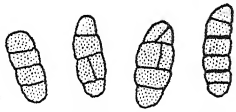

Fig. 48. *Camarosporium Rosae*: on *Rosa damascena*, four spores from the same pycnidium, ×600.

On old stems of *Rosa damascena*. Edgbaston Botanic Gardens, Birmingham. May.

This is quite different from most of the specimens called *Hendersonia Rosae* Westd. in herbaria.

Rubus

Camarosporium rubicolum Sacc. Syll. iii. 462. All. vii. 282. Died. 682. Grove, in Journ. Bot. 1916, p. 218, pl. 543, f. 6. *Hendersonia rubicola* Sacc. in Mich. i. 209.

Pycnidia scattered or gregarious, subepidermal, then erumpent (sometimes by a slit), elliptic or globose, depressed,

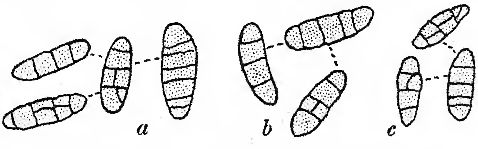

Fig. 49. *Camarosporium*: *a*, *C. rubicolum*; *b*, *C. Feurichii*, f. *major*; *c*, *C. Feurichii*; spores, all ×600.

with a small papilla, black, seated on the wood, up to 500μ long; wall very thick and dark outside, paler inwards. Spores ellipsoid to narrowly obovoid, with three (rarely four) septa, not constricted, at first pale, then dusky-brown, 12–22 × 5–6·5μ (or even 8μ), all the loculi equally dark when mature,

one, two, or three of them longitudinally or obliquely divided; sporophores short. (Fig. 49*a*.)

On dead shoots of *Rubus fruticosus*, Shustoke, Wk. On *Rubus discolor*, Hereford. Feb.–Apr.

This species cannot easily be confused with *Hendersonia Rubi* Westd. (which is a Coryneopsis, *q.v.*), since it has the loculi of the spores all equally coloured and the spores are not subacute at the base.

Fr. Belg. Germ. Ital. U.S.A.

Salix

Camarosporium salicinum Grove. *Hendersonia salicina* Vize, in Grevill. vi. 72, pl. 97, f. 17 (*non* Sacc., *nec* Cooke).

Pycnidia densely scattered, roundish with a protruding ostiole, bursting the epidermis, sometimes two together, black, about 500μ diam.; texture of very small crowded cells; wall two or more cells thick. Spores oblong, 3-septate, the end-cells longer than the others, slightly constricted, with very often one longitudinal septum, 16–18 $\times$ 6–7μ, dark-brown, at length exuding and staining the host-surface around the ostiole as in *Melanconium*; sporophores as long as the spore.

On twigs of *Salix*, Kew; Sling Common, Clent, Ws. On *Salix alba*, Heythrop Park, Oxon. (Rhodes). On old Willow twigs, Forden (Vize). On *Salix fragilis*, Quinton, Ws. May, Jun.

Spores at first Phoma-like, small, colourless, then elongating and becoming first 1-septate, exactly like a Diplodia, then 3-septate and at the same time tinged with brown, at length completely dark olive-brown and furnished with a single longitudinal septum. Cf. *Diplodia salicina*, *supra*, and *Dichomera salicina*, *infra*.

"*Hendersonia salicina*" Sacc. Syll. iii. 425, which Cooke records on branches of *Salix* and which appears to be nearly or quite the same as *Coryneum maculicolum* Fckl. (Sacc. Syll. iii. 777), seems to me, judging by the descriptions, to belong to Coryneopsis. Some of Cooke's specimens, however, are a mixture of three distinct species: *Hendersoniella viminis* (R. & F.) *q.v.*, and a fungus resembling *Dothiorella gregaria*, with an imperfectly developed pyrenomycete. Vize's Hendersonia would seem to be the pycnidial stage of *Cucurbitaria Hendersoniae* Fckl. Symb. Myc. p. 172, pl. 4, f. 43 *a* = *Melanomma Hendersoniae* Sacc. Syll. ii. 109. A Diplodia-like spore is said to have accompanied the Hendersonia in Fuckel's Cucurbitaria. It is true,

probably, of nearly all the specimens recorded as Hendersonia on *Salix* (except those which are really a Coryneopsis) that they belong to Camarosporium.

Sarothamnus

Camarosporium Spartii Trail, in Scot. Nat. new ser. iii. 222 (1888).

Pycnidia scattered singly or arranged in lines or aggregated in dense groups with the ascophorous stage, about 200μ diam., black, erumpent, rugose. Spores oblong, obtuse at both ends, very dark-brown, 13–15 × 6–7μ, at length 3-septate, with an occasional longitudinal division; sporophores not seen.

On dead branches of *Sarothamnus scoparius*. Aberdeen (Trail). Stevenston, Ayrshire (Boyd), accompanied by an Ascomycete. Sept.

The accompanying ascomycete was presumably *Cucurbitaria Spartii* C. & de Not., on *Sarothamnus* (Sacc. Syll. ii. 312), although its acute-ended spores seemed to agree more closely with those ascribed by Saccardo (p. 309) to *C. elongata* on *Robinia*. Those two ascomycetes are at any rate closely allied. The mature pycnospores, however, were much smaller on *Sarothamnus* than those of *Camarosporium Robiniae* (*q.v.*).

But the spores in some of the smaller pycnidia presented a very remarkable medley; every shape and size could be found side by side between a subglobose continuous cell (reminding one of a large-spored Coniothyrium) and septate ones—1-septate (like a Microdiplodia), then larger like *Diplodia Sarothamni*, then 2-septate, then 3-septate, and at last with one loculus divided by a single longitudinal septum. A similar medley is to be found assembled with *Cucurbitaria Laburni*, and one could recall also the varying states of growth seen in connexion with *Diplodia Buxi* and its var. *minor*, as detailed in Journ. Bot. 1912, p. 51 (see *supra*, p. 36).

Spiraea

Camarosporium Spiraeae Cooke, in Grevill. xiii. 97. Sacc. Syll. x. 340. All. vii. 285. Died. 683.

Pycnidia scattered, rather large, covered by the elevated epidermis, erumpent, globose, black. Spores ellipsoid, mostly 3-septate, with one or two longitudinal septa, not constricted, pale-brown, 18 × 7·5μ.

On slender twigs of *Spiraea callosa*, *S.* (*Neillia*) *opulifolia*. Kew Gardens. *n.ex.*

Germ.

Staphylea

Camarosporium Staphyleae Cooke, in Grevill. xiv. 5. Sacc. Syll. x. 342. All. vii. 285.

Pycnidia scattered, covered by the bark and concealed, rather large, black, globose-depressed, flattened, rarely slightly elevating the epidermis. Spores ellipsoid, 3–4-septate, one or other of the central cells longitudinally divided, not constricted, smoky- (*not* clear-) brown, $18–20 \times 8\mu$.

On branches of *Staphylea pinnata*, *S. trifoliata*. Kew Gardens.

"What appeared to be the same species occurred on slender twigs of *Celtis*" (Cooke).

Syringa

Camarosporium Syringae Cooke & Mass. in Grevill. xvi. 9 (1887). Sacc. Syll. x. 343. All. vii. 286.

Pycnidia somewhat gregarious, on bleached spots, immersed, elevating and at length piercing the epidermis, subglobose or oblong, papillate, black. Spores ellipsoid, 3-septate, not much constricted, with one or two of the loculi longitudinally divided, brown, $15–17 \times 8–11\mu$.

On twigs of *Syringa Emodi*, Kew Gardens. On twigs of *Syringa vulgaris*, Kidderminster (Rhodes). June.

This is not *C. Syringae* Oud. which is *C. Oudemansii* Sacc. & Syd. Syll. xiv. 966; All. vii. 286.

Tamarix

Camarosporium Tamaricis Grove. *Hendersonia Tamaricis* Cooke, in Grevill. xiv. 5, *p.p.* Sacc. Syll. x. 318. All. vii. 241 (*non* Migula).

Pycnidia loosely gregarious, long covered by the elevated epidermis, subglobose, scarcely papillate. Spores ellipsoid, sometimes slightly attenuated at the ends, mostly 3-septate, not constricted, clear-brown, $18–20 \times 6–7\mu$; a few are 2-septate, and some (the most mature) 4–6-septate with a few longitudinal septa; sporophores not seen.

On twigs of *Tamarix gallica*. Kew Gardens (Cooke). Budleigh Salterton, Devon (Rhodes). Mar. Apr.

Cooke's specimen examined. Like so many other species called Hendersonia, this is found on looking long enough to yield Camarosporium spores. *Hendersonia tamaricicola* Brun. (Sacc. Syll. xiv. 956) does not seem to differ in any essential respect.

Tanacetum

Camarosporium Kriegeri Bres. in Hedwig. 1896, p. 200. Sacc. Syll. xiv. 965. All. vii. 287. Died. p. 683, p. 640, f. 32. Mig. 371.

Pycnidia densely gregarious, globose or oblong, depressed, convex, raising the epidermis, rather thin-walled, about 300μ across. Spores having a cuboid or ovoid shape, yellowish-brown, with 2–5 transverse septa and a few longitudinal or radiating ones, 16–18 × 14–17μ; sporophores hyaline, 8–10 × 2μ. (Fig. 46*b*.)

On dry stems of *Tanacetum vulgare*. Hanbury and Piper's Hill Wood, Dodderhill Common, Ws. (Grove & Rhodes). Oct.

Migula states that the spores sometimes reach a length of 24–26μ. Germ.

Tilia

Camarosporium Tiliae Sacc. & Penz. in Mich. ii. 630; Syll. iii. 462. *Hendersonia Tiliae* Lév. in Ann. Sci. Nat. 1846, v. 288. Sacc. Syll. iii. 424. All. vii. 243.

Pycnidia gregarious, immersed in the bark, black without and within, globose, papillate, with a minute ostiole. Spores oblong-oval, rounded at both ends, rich-brown, 3-septate, not constricted, 15–18 × 5–7μ.

On bark of *Tilia parvifolia*, Kew Gardens. On the same, Ockeridge Wood, Worcestershire (Rhodes). On bark of twigs of *Tilia europaea*, Cheshire and Lancashire (Ellis). Nov.–Jun.

The spores are at first colourless and ovoid, then ellipsoid, pale-brown and 1-septate, at length longer, 3-septate and of a rich-brown colour. Some are irregular, 18μ long, with four or five transverse septa and an occasional longitudinal one.
Fr.

Viburnum

Camarosporium Lantanae Sacc. Syll. iii. 466. All. vii. 288. Died. 685. Mig. 372. *Hendersonia Lantanae* Fleisch., in Hedwig. 1869, p. 89.

Pycnidia globose, mouthless (?), lying free between the hairs of the host. Spores oblong, with 2–3 transverse septa, and also one or two longitudinal ones, fuscous-brown, 12–18 × 8μ.

On twigs of *Viburnum Lantana*. Wilmcote, Wk. Sept.

C. Viburni Bäuml. Crypt. Pressb. p. 17 (Sacc. Syll. x. 343) differs in being immersed in the cortex beneath the epidermis, and in having

ellipsoid-ovoid spores, fuliginous, not constricted, 5–7-septate, afterwards muriform, 20–24 × 6–10 μ. On dry twigs of *Viburnum Lantana*, at Pressburg, Hungary.

Germ.

CAMAROGRAPHIUM Bubák, in Ber. Deutsch. Bot. Ges. 1916, xxxiv. 306, emend.

Pycnidia erumpent, black; wall parenchymatous, thick or thin. Spores ovoid-oblong, thick-walled, fuliginous, clathrato-muriform; sporophores colourless, ± filiform.

The spores tend rather to resemble those of Coryneum or of Steganosporium than those of Camarosporium.

Coniferae

Camarographium Abietis, comb. nov. *Camarosporium Abietis* Wilson & Anders. in T.B.M.S. 1924, ix. 150.

Pycnidia erumpent and prominent, often scattered or closely aggregated in groups of 5–10, very convex, globose-hemispherical or shortly oblong, black, nearly smooth, at first mouthless, 0·5–1 mm. diam., frequently seated on a thin subiculum; texture often thick, hard and opaque. Spores broadly fusoid, at first continuous, hyaline, then dilute-fuscous, transversely 2–5–8–10-septate, many loculi with 2–4 oblique or curved longitudinal walls and the end-cells sometimes paler, not constricted, smooth, finally darker, cells often guttulate, 30–60 × 10–17 μ; sporophores filiform-linear, now and then septate, hyaline, as long as the spore or longer (up to 80–100 μ), becoming mucilaginous. (Fig. 50.)

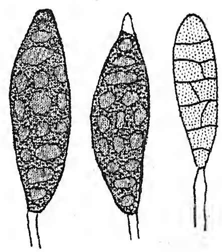

Fig. 50. *Camarographium Abietis*: two mature and one immature spore, × 600.

On branches of *Abies Lowiana*, Arniston near Edinburgh (Wilson). On small branches and especially on leaf-scars of *Picea*, Battle, Sussex (Rhodes). On leaf-scars of *Picea Pinsapo*, Hadzor Hall, Droitwich, accompanied by *Oncospora Pinastri*. Feb.–Apr.

The oil-guttules in the cells are sometimes very conspicuous. The spores bear a certain resemblance to those of Coryneum.

Psamma

Camarographium metableticum, comb. nov. *Camarosporium metableticum* Trail, in Scot. Nat. 1886, ii. 267. Sacc. Syll. x. 347. All. vii. 260. Died. p. 668, p. 640, f. 34. *C. graminicolum* Ell. & Ev. in Proc. Acad. Nat. Sci. Phil. for 1893, p. 161.

Pycnidia immersed, scattered, subglobose, 200–250 μ diam., with a very short ostiole which just pierces the epidermis. Spores very variable, ellipsoid or trapezoidal, not or scarcely constricted at the middle, pointed or rounded at the ends, clear- or sometimes sooty-brown, usually about 30×10–$12\,\mu$; transverse septa 3–7 (usually 5 or 6), with a longitudinal partition in some (1–4) of the middle cells, end cells sometimes a little paler. (Fig. 51.)

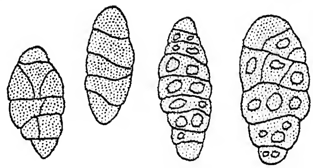

Fig. 51. *Camarographium metableticum*: spores, $\times 600$.

On dead leaves of *Psamma arenaria*. Near Aberdeen (Trail). Ayrshire (Boyd). Tenby Burrows, Pembr. (Rhodes). Near Liverpool (Travis). Also at Sandwich and Borth, accompanied in both places by *Sporodesmium myrianum* Desm.

The spores vary in length from 20 to 35 μ; they resemble the ascospores of *Fenestella princeps* Tul. The American specimens differ only in having the spores clear olivaceous-brown, never sooty, and smaller pycnidia (less than 150 μ), arranged in lines.

Germ. U.S.A. (on the culms).

Pteridium

Camarographium Stephensii Bub. in Ber. Deutsch. Bot. Ges. xxxiv. 306. Sacc. Syll. xxv. 402. *Hendersonia Stephensii* B. & Br. in Ann. Nat. Hist. 1851, vii. 95. Cooke, Handb. 436. See Tul. Carp. ii. 71. *Camarosporium Stephensii* Sacc. Syll. iii. 469. All. vii. 278. Cooke, in Grevill. xiv. 67.

Pycnidia irregular, oblong, membranaceous, about 300 μ diam., disposed in lines, at first covered by the epidermis which becomes brown and opens by a fissure; wall thin, sometimes imperfect. Spores large, ovoid, 3-septate, filled with large oily guttules, then abundantly reticulated-muriform, smoky-brown, 40–50×20–$30\,\mu$; sporophores colourless, short. (Fig. 52.)

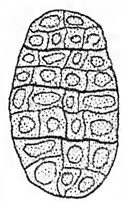

Fig. 52. *Camarographium Stephensii*: spore, $\times 600$.

On dead petioles (stipes) of *Pteridium aquilinum*. Leigh Woods, Bristol (H. O. Stephens). Arran and Cumbrae Is., Bute; Ardrossan, Ayrshire (Boyd). Blenheim Park (Buddin). Bardon Hill. May–Jul.

Berkeley calls it "a very beautiful species", and says that it is probably often overlooked for *Rhopographus filicinus* (or its early stage *Leptostroma filicinum*), in company with which it occurs. Its spores are much like those of *Steganosporium cellulosum*; it has distinct pycnidia, arranged in a linear series, without any real stroma, but possessing a well-marked wall, composed of several layers of soft ± parenchymatous smoky-olive cells. The pycnidia are usually in rows of two to four, within a whitish pseudostroma, which is apparently formed of the hypertrophied tissue of the host. After the spores become 3-septate numerous longitudinal partitions make their appearance, as well as a few fresh transverse ones.

Germ.

DICHOMERA Cooke, Praecurs. Monogr. Henderson. 24.

Pycnidia immersed in a pulvinate erumpent dothideaceous stroma, globose, with a small papilla. Spores globose or ellipsoid, 2–4-septate and muriform, or more often radiately or cruciately 3–6-septate, dark-brown or fuliginous, on short sporophores.

The genus bears a resemblance to *Camarosporium*, but differs in its densely aggregated pycnidia which are partially immersed in the stroma.

Plurivorous

Dichomera Saubinetii Cooke, Praecurs. Monogr. Henders. in Nuovo Giorn. Bot. Ital. 1878, x. 24. Sacc. Syll. iii. 471. All. vii. 292, with fig. Died. p. 686, p. 640, f. 42. Mig. p. 373, pl. 47, f. 12–15. *Hendersonia Saubinetii* Mont. Syll. Cr. p. 263; Ann. Sci. Nat. 1849, xii. 310.

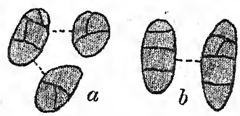

Fig. 53. *Dichomera*: spores of *a*, *D. Saubinetii*; *b*, *D. salicina*, from Dr Ellis's specimen; ×600.

Stroma Dothidea-like, erumpent, roundish-elliptic, rather flat, black and opaque on the surface, fuscous-black within, up to 600μ diam. Pycnidial loculi immersed in several rows, the superficial ones with white contents, the deeper placed with brown contents. Spores subglobose or ovoid, 8–10 μ diam. or 11–12 × 8–9μ, biseptate and muriform,

or more often radiately 3–5-septate, gently constricted, smoky-brown; sporophores cylindrical, hyaline, shorter than the spore, 1·5–2μ thick. (Fig. 53*a*.)

On branches of *Rhamnus Frangula*. Highgate; Hampstead; Leinster, etc. On *Quercus*, Langridge and Bristol. On *Acer*, Bristol.

Recorded abroad on *Sambucus* and *Sorbus* also.
Fr. Germ. Ital.

Cytisus

Dichomera Laburni Cooke & Mass. in Grevill. xviii. 54. Sacc. Syll. x. 348. All. vii. 291.

Pycnidia caespitose, erumpent, globose, black, opaque, crowded in considerable numbers upon a definite stroma about 5 mm. wide. Spores ellipsoid, 3-septate, with one or more longitudinal septa, smoky-brown, 22–25 × 7μ; sporophores short.

On branches of *Cytisus Laburnum*. Blakey, Leicester (F. T. Mott, from W. A. Vice). Feb.

No doubt a pycnidial stage of *Cucurbitaria Laburni*, like *Camarosporium Laburni*; and probably merely a state of the latter which happened to arise on a stroma belonging strictly to the pyrenomycetous stage—which statement may be equally true of other species of Dichomera.

Platanus

Dichomera mutabilis Sacc. Syll. iii. 471. All. vii. 291. Died. 686. Mig. 373. *Hendersonia mutabilis* B. & Br. in Ann. Nat. Hist. 1850, v. 373. Cooke, Handb. 435.

Stromata depressed, elliptical, black, plurilocular within, subepidermal and scarcely erumpent. Spores oblong-ellipsoid, with three to five transverse septa and here and there a longitudinal one, clear brown, 16–18 × 6–7μ (from the original specimens).

On dead twigs of *Platanus*. Batheaston (Broome). Elmhurst (Berk.). Recorded in Yorkshire Fung. Flor. on dead "Sycamore twigs" (? Plane). Feb. Mar.

"A few central cells, besides the large cell or perithecium which occupies the whole of the pustule; the central cells are developed later than the main cell, so that the spores in the former are simple or uniseptate while in the larger cell they have acquired a much

larger size, and have three or four transverse septa with the articulations here and there divided" (B. & Br.).

Germ. (on *Corylus* also).

Ribes

Dichomera ribicola, nov. comb. *Hendersonula ribicola* Cooke in Herb. Kew.

Pycnidia or loculi clustered two or three together in a brown Dothidea-like stroma which appears to be formed from the altered bark, occasionally single, erumpent, brownish-black. Spores ovoid or ellipsoid, very obtuse above, irregular, rich dark-brown, mostly 3-septate with a few longitudinal or oblique septa (but remaining for a long time 1-septate and like those of Diplodia), not constricted, $12–16 \times 5{\cdot}5–6{\cdot}5\,\mu$.

On twigs of *Ribes sanguineum*. Kew (Cooke). March.

Spores very variable, 1, 2, or 3-septate (exactly like a typical Hendersonia), finally with one or two oblique septa in addition.

Salix

Dichomera salicina Sacc. Syll. iii. 471. All. vii. 293, with fig. Cf. *Hendersonia salicina* Vize, in Grevill. 1877, vi. 72, pl. 97, f. 17, *p.p.* (*non* Cooke, for which see under *Camarosporium salicinum* Gr.).

Pycnidia gregarious, erumpent, flattened, black, confluent or Dothidea-like. Spores ellipsoid, rounded at both ends, 3-septate, with one or two cells usually divided longitudinally, $15–22 \times 8–10\,\mu$. (Fig. 53*b*.)

On dead twigs of *Salix Caprea*, *S. viminalis*, Cheshire (Ellis), with spores $15–19 \times 7–8\,\mu$, rarely 4-septate.

CYTOSPORIUM Peck, in Bot. Gazette, 1879, iv. 171 (as *Cellulosporium*), emend. Sacc. Syll. iii. 470.

Pycnidia superficial or nearly so, subglobose, black, papillate or irregularly dehiscent, subcarbonaceous. Spores ovoid or oblong, fuliginous, with two or more transverse septa and one or more longitudinal divisions.

It is like a superficial Camarosporium growing on wood, not in or on bark, and stands to Hendersoniella exactly as Camarosporium does to Hendersonia.

Cytosporium Melanomma, sp. nov.

Pycnidia gregarious, growing on wood, sunk into it by the base only, ovoid, up to 500μ broad, carbonaceous, fragile, glabrous, black, opaque, dehiscing irregularly. Spores ellipsoid, rounded at both ends, 3-septate and at length muriform, olivaceous-brown, becoming fuliginous, $15–16 \times 8–9\mu$.

On dead branches of *Fraxinus excelsior* which had lost their bark. King's Heath, near Birmingham. Aug.

The spores are at first continuous (though brown), then 1-septate, finally 3-septate, sometimes constricted, and with the second or the two middle cells longitudinally divided. The mature spores are nearly opaque. The pycnidium reminds one of a Melanomma; it resembles that of *Cellulosporium sphaerosporum* Peck on decaying wood, in Illinois, but the spores are different. Cf. *Camarosporium Orni* Henn., *supra*, p. 96. It must be considered, in each such case, whether the pycnidium may not have grown originally in the bark (though seated on the wood), and then have been left to look superficial by the decay and disappearance of the bark.

NECTRIOIDEAE

Pycnidia (and the stroma, if there is one) fleshy or waxy, soft, not (until old) dark-coloured, but whitish, yellow, orange, red, steel-blue, grey, or clear-brown, globose or subglobose (? sometimes saucer-shaped or even bilabiate). Spores variable, but always hyaline or bright-coloured.

Many of this group are pycnidial stages of ascophorous genera belonging to Hypocreaceae. The peziziform species usually classed in the section Olluleae (Patellinae and the like), which belong as pycnidia to Discomycetes, are better placed in EXCIPULACEAE, *q.v. infra*, p. 125.

I. Pycnidia not immersed in a stroma.

  A. Spores short, oval or ellipsoid, continuous.

    1. Pycnidia not beaked . . . . *Zythia*

    2. Pycnidia beaked . . . . *Sphaeronaemella*

       See also *Ampullaria*

  B. Spores elongated, fusoid or oblong.

    1. Pycnidia not beaked; spores continuous.

      a. Spores with appendages . . . . *Ciliospora*

      b. Spores without appendages . . . . *Sclerozythia*

    2. Pycnidia beaked; spores 1-septate . . *Mycorhynchus*

II. Pycnidia immersed in or seated on a stroma or subiculum; spores filiform.

  A. Spores arranged in groups . . . . *Eriospora*

  B. Spores not united with one another . . . *Polystigmina*

In addition, since it consists of growth-stages of Hypocreaceae, this is as suitable a place as any for the anomalous genus called *Fusidomus*. This latter is a pseudo-genus, designed to call attention to certain cases, which occur rarely indeed, but are easily recognised, when in good condition, by their colour. The "species" consist of Fusarium-like spores enclosed within a pycnidial wall which has its component cells here and there tinged with a striking and distinctive blue or violet, although others of the cells may be brown. These anomalous forms arise from the production of the hyphomycetous spores of a pleomorphic species within a peridium that properly belongs to the ascophorous stage of the fungus concerned.

For an exactly parallel case among the Melanconiales, consult Pseudodiscosia and Heteropatella, *infra*, p. 285 (and p. 156).

ZYTHIA Fr. Summ. Veg. Scan. 407.

Pycnidia immersed or superficial, globose, with a more or less evident papilla; wall of small cells, waxy-fleshy, yellow, orange, or red. Spores linear, ovoid, or oblong, eseptate, hyaline; sporophores various.

Beta

Zythia leucoconia Sacc. Syll. iii. 615. All. vii. 299. *Sphaeronaema leucoconium* B. & Br. in Ann. Nat. Hist. 1850, v. 371. Cooke, Handb. 425.

Pycnidia gregarious, hyaline, plano-convex, depressed, somewhat irregular, obtuse, pierced by a round pore, seated on a white floccose subiculum. Spores ellipsoid, obtuse at both ends or somewhat pointed below, 5–6 × 2–3 μ.

On decaying roots of *Beta*. King's Cliffe, Northamptonshire (Berk.). Nov.

"Forming a thin stratum, consisting of minute, depressed, sub-hemispherical or irregular, white pycnidia, simply pierced with a minute pore, and seated on branched white threads, of which a few spring from the sides. There is no papilliform or elongated ostiole, but the convex pycnidium is merely pierced in the centre" (B. & Br.).

Texture of the pycnidium minutely parenchymatous, pale-brownish in the specimens examined; spores like those of Phoma.

Mercurialis

Zythia Mercurialis Kickx, Flor. Crypt. Flandr. 1867, i. 449. Sacc. Syll. iii. 615. All. vii. 300. Mig. 472. T.B.M.S. vi. 155. (? Not *Sphaeronaema Mercurialis* Lib. Fung. Ard. no. 264. Kickx, Rech. iii. 20.)

Pycnidia scattered or congregate, dull-yellow, then rust-coloured, at length brownish-black, subglobose, pierced at the apex by a pore. Spores oblong or oval, very small, exuding as a yellowish globule.

On leaves, petioles, and stalks of *Mercurialis perennis*. Lancashire, and near Selby, Yorkshire.

Pycnidia 100–125 μ in width; spores ovoid to ellipsoid, 5 × 2–2·5 μ; mixed with these were a few spores, about 10 × 3 μ, which were occasionally 1-septate and constricted at the septum.

Belg. (Ardennes).

SPHAERONAEMELLA Karst. in Hedwig. 1884, p. 17. Sacc. Syll. iii. 617.

Pycnidia subglobose, membranaceous, with thin or thick walls, soft, bright-coloured, with a subulate beak; texture parenchymatous or prosenchymatous. Spores unicellular, hyaline, sometimes provided with appendages or involved in mucus, usually exuding from the apex of the beak as a little globule.

Dung

Sphaeronaemella fimicola Marchal, in Bull. Soc. Roy. Bot. Belg. 1891, xxx. 143. Sacc. Syll. x. 407. Mass. & Salm. in Ann. Bot. xvi. 75, f. 38–43. All. vii. 307.

Pycnidia gregarious or scattered at short intervals, superficial, reddish-yellow, about 1 mm. high and 150–200μ broad, membranaceous, soft, glabrous, basal part globose, parenchymatous, composed of delicate polygonal cells about 10μ wide, abruptly narrowed into the long (700–800μ) narrow subulate beak which is subhyaline and penicillate at the apex. Spores narrowly ellipsoid, somewhat obtuse at both ends, straight or slightly curved, 6–7·5 × 2–2·5μ, involved in mucus and at maturity expelled at the ostiole in a white ovoid mucilaginous drop.

On dung of Rabbits, Sheffield and Leith Hill, Surrey; of Hares, Kew; and of Deer, Epping Forest. Rokeby, Mulgrave Woods, and Farnley Tyas, Yorkshire; Derbyshire; etc.

Feb.–Nov.

A form with a shorter beak was found on dung of Rabbits in Belgium (var. *minor* March. *l.c.*).

Belg.

Fungi

Sphaeronaemella subulata, comb. nov. *Sphaeronaema subulatum* Grev. Scot. Cr. Flor. pl. 189 (1826). *Sphaeronaema oxysporum* Berk. Dec. of Fungi, no. 136, in London Journ. Bot. 1847, p. 325. *Sphaeronaemella oxyspora* Sacc. Syll. iii. 618. Smith, in T.B.M.S. i. 199, pl. 9, f. 9.

Pycnidia clustered or scattered, subglobose below, 300–400μ diam., tapering upwards (conoid) or flask-shaped with a subcylindrical neck, pellucid, hyaline, but becoming yel-

lowish or brownish when dry; wall parenchymatous, with cells about 7 μ wide; ostiole faintly fimbriate. Spores terminal or lateral on a main hypha which is branched septate and at the base 2–3 μ thick, oval, hyaline, subacute at both ends, especially at the upper, 5–9 × 1·5–2·5 μ, attenuated below into a short pedicel and bearing an apical seta 3–7 μ long. (Fig. 54.)

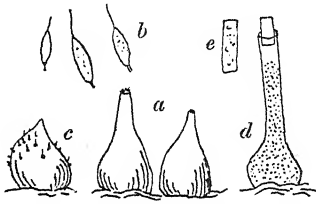

Fig. 54. *Sphaeronaemella subulata*: *a*, two pycnidia, × 24; *b*, spores, × 720; *c*, a pycnidium encrusted with *Chalara*; *d*, *Chalara fungorum*, × 500; *e*, a spore of the *Chalara*, × 600.

On dead *Boletus* and *Agaricus*, Scotland (Greville). On dead *Lactarius*, Cambridge (Berk.). On a dead *Agaricus*, North Wales (A. L. Smith). On *Sparassis crispa*, Westwick, Norfolk (Petch).

Sept. Oct.

The pycnidial stage of *Eleutheromyces subulatus* Tode.

Berkeley's American specimen no. 136 (*l.c.*) was on a decaying Polypore from Ohio. He did not, of course, suspect its identity with the pycnidial form of the Eleutheromyces, which remained a matter of controversy until Petch published his description of it (without naming it) in Journ. Bot. 1935, pp. 187–188. Von Höhnel also (Frag. Myk. no. 32, 1902) found the pycnospores. It is curious that the spores of the pycnidial and ascophorous stages are so similar to each other as to be almost indistinguishable.

On the Norfolk specimens was a parasite, *Chalara fungorum* Sacc., a colourless Hyphomycete with remarkable "endoconidial" spores (7–15 × 3–4 μ), which is also shown in the figure.

In Sacc. Syll. xxii. 1142 there is a description of *Eleutheromycella mycophila* v. Höhn. (on *Polystictus versicolor*), which has a conical papilla (not a beak) and fusoid spores, 8–11 × 1·5 μ, with an apical seta 24–40 μ long, but otherwise seeming very similar to *S. subulata*.

Germ. U.S.A.

Gelatine

Sphaeronaemella glomerata, sp. nov.

Pycnidia single or collected into little clusters of 3–6, superficial, soft, ovoid with a beak-like ostiole, i.e. obpyriform, 200–300 μ diam., pure rose-colour, then rosy-brownish, surrounded at the base by numerous delicate rosy entwined hyphae; ostiole fimbriate with a number of very short projecting hair-like cells. Spores very numerous, oval, obtuse

at both ends, often somewhat curved, biguttulate, nearly colourless, 3–5 × 1·5μ.

Growing as a weed on a gelatine culture in a Petri-dish, Birmingham, March, 1921 (Miss O. Stansfield)!

It has not been met with elsewhere.

AMPULLARIA A. L. Smith, in Journ. Bot. 1903, xli. 258.

"Pycnidia growing singly, bright-coloured, globose, with a long ostiole (neck), formed of delicate cells. Spores ovoid, dark-coloured when mature."

There is no doubt that this genus is a mistaken interpretation of a species of Melanospora. See Mason, in "Annotated Account of Fungi", Imperial Mycol. Instit., List II, fasc. 2, p. 43 (1933).

Trifolium

[**Ampullaria aurea** A. L. Smith, in Journ. Bot. *l.c.*, pl. 454, f. 3–5. Sacc. Syll. xviii. 416.

"Pycnidium semi-immersed or superficial, globose, up to 170μ diam., the outer wall about 20μ thick, of two or three layers of cells, transparent and showing the dense mass of spores crowding the interior and lying at all angles; neck about 250μ long, ending in a spreading pencil of pointed hyphae. Spores oval, acute at both ends, colourless, then dark-grey or almost black, 18 × 12μ, escaping singly through the long neck and forming a globule at the mouth."

On dead seeds of *Trifolium*. Norwood. *n.v.*

Saccardo remarked (*l.c.*) that this was probably a species of Melanospora in which the asci had deliquesced; it is now certainly known to be so.]

CILIOSPORA Zimmerm. in Centralbl. f. Bakter. 1902, 2. viii. 217, with figs.

Pycnidia superficial, gelatinous. Spores 1-celled, hyaline, provided on the surface near each end with appendages which bear some resemblance to the cilia of Bacteria.

Epilobium

Ciliospora albida, nov. comb. *Dilophospora albida* Mass. & Crossl. in Naturalist, 1904, p. 3. Sacc. Syll. xvii. 405.

Pycnidia gregarious, somewhat elliptical, gelatinous, pallid-white, about 1 mm. broad and high. Spores subcylindrical, obtuse at the ends, 30–40 × 7–8 μ, bearing at each end 3–6 gelatinous appendages.

On dead stems of *Epilobium hirsutum*. Hebden Bridge, Yorks. (J. Needham). Aug.

"Pycnidia rudimentary, collapsing and forming little discs with reddish-brown margins. Spores with granular contents, sometimes slightly curved; from 3 to 5 hyaline bristles, sometimes slightly inflated at the base, spring from near the two ends" (M. & C.).

Pycnidia 0·5–1 mm. long, gregarious, roundish or elongated, whitish, then honey-coloured when dry, the upper part very much thicker, becoming highly gelatinous and at length permitting the escape of the spores. Spores oblong-fusoid, obtusely rounded at the ends, faintly coloured, 28–40 × 6–8 μ, furnished at each end at or below the extremity with 0–5 extremely variable, straight, flexuous, or recurved, highly granular gelatinous appendages, which vary in length from 3 to 25 μ and in width from 0·5 to 3 μ. When dry, this fungus resembles externally a very small Dacryomyces. The hyphae which form the upper part of the pycnidium are dichotomously branched; their walls become strongly swollen and leave a very narrow lumen. The enclosed cavity of the pycnidium is imperfectly divided into several locelli; its floor is paved with short erect crowded filiform sporophores, from which the spores seem to arise singly as in a Gloeosporium, though they lie in the pycnidium in long flexuous rows.

Ciliospora gelatinosa Zimm. *l.c.* p. 217 is a similar species on decaying coco-nuts, Java, with thickly crowded hyaline pycnidia and rather straight stiff cilia.

SCLEROZYTHIA Petch, gen. nov.

Pycnidia superficial, bright-coloured, at first mouthless, solid, parenchymatous. Spores hyaline, continuous, sessile on the parenchyma.

Brassica

Sclerozythia Brassicae Petch, sp. nov. *in litt.*

Pycnidia scattered or gregarious, ovoid or subglobose, up to 250 μ diam., dark-umber, then red, glabrous, with a thick parenchymatous wall composed of cells up to 27 × 22 μ, externally pale-yellow, then red, internally hyaline, at first closed, then opening by a pore. Spores oblong-oval, con-

tinuous, smooth, hyaline, 15–30 × 7–11 μ, arranged in short parallel lines, but not remaining in chains.

On decaying stems of *Brassica*, North Wootton, Norfolk. June, 1935.

MYCORHYNCHUS Sacc. Syll. xviii. 418 (1906).

Pycnidia subglobose below, ending above in a long subulate beak, rather soft, bright-coloured. Spores fusoid-bacillar, acute, 1-septate, hyaline, gradually attenuated downwards into a cuspidate seta.

It is a Sphaeronaemella with narrow elongate uniseptate spores.

Dung

Mycorhynchus Marchalii Mig. 477. Grove, in Journ. Bot. 1932, p. 1, pl. 599, f. 1. *Rhynchomyces Marchalii* Sacc. & March. Champ. Copr. p. 28. Sacc. Syll. x. 411. All. vii. 314. Died. p. 701, p. 690, f. 9.

Pycnidia in very crowded groups or even connate, superficial or nearly so, tawny or ochraceous-yellow, 200–300 μ in total height, ovoid or subglobose below and 50–70 μ broad, tapering upwards into a long subulate beak which measures 100–150 × 10–25 μ; texture of venter of ochreous translucent loosely arranged wide parenchymatous cells, those of the beak similar but elongated, vermiform, longitudinally arranged and ± parallel. Spores fusoid, tapering and very acute above, acuminate below where they end in an often oblique seta (up to 10 μ long), colourless, with several guttules, at length 1-septate, 50–70 × 6 μ, enveloped in mucus. (Fig. 55.)

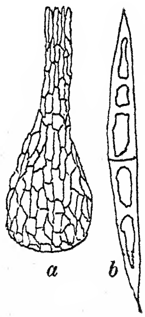

Fig. 55. *Mycorhynchus Marchalii*: *a*, pycnidium, × 130; *b*, spore, × 600.

On horse-dung, Walton, Liverpool (Travis). Apr.

Possibly this is an Eleutherosphaera (Rhynchonectria) with vanished asci. See Journ. Bot. *l.c.*, p. 2.

Ardennes.

ERIOSPORA B. & Br. in Ann. Nat. Hist. 1850, v. 455.[1]

Stroma multilocular; loculi globose-flattened, expelling the spores through a common orifice; wall thick, with a dark outer layer and a ± gelatinous hyaline inner layer. Spores in the form of several filiform bodies perched on the summit of a short cylindrical base.

Berkeley rightly regarded the "appendages" or filiform bodies as the spores; Diedicke mistakenly considered the whole complex, appendages and base, as a spore belonging to the Staurosporae.

Carex, Juncus, Typha

Eriospora leucostoma B. & Br. in Ann. Nat. Hist. 1850, v. 455, pl. 11, f. 1. Cooke, Handb. p. 465, f. 177. Sacc. Syll. iii. 600. All. vi. 947, with fig. Died. p. 699, p. 690, f. 7 *a–d*. Mig. p. 481, pl. 62, f. 11, 12. See Lind, in Ann. Mycol. v. 277.

Spots pitchy-black. Stromata depressed, effused, thin, margined, scarcely 2 mm. broad, multilocular, dehiscing in the centre by a papillate white-bordered pulverulent opening; loculi varying in number, subglobose or confluent and flattened. Spores (or spore-appendages) filiform, often curved or hooked at the upper end, 50–70 × 0·75–1 μ, seated in bundles of three to six on a short cylindrical or oblong base or pedicel. (Fig. 56.)

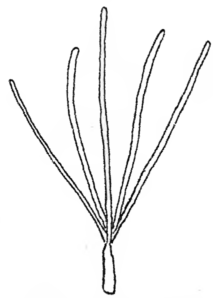

Fig. 56. *Eriospora leucostoma*: group of spores, × 600.

On dead leaves of *Carex* and *Typha*. Spye Park, Wilts. Feb. Recorded in Germany on *Carex* and in Denmark on *Juncus*. Very rare.

"Spots pitch-brown; very thin and diffused towards the edges, not a line broad, marked in the centre with a punctiform white-bordered pulverulent aperture. Spores very long, filiform.... Not unlike *Micropera Drupacearum* but spores different" (B. & Br. *l.c.*).

The spores with the base look like a short-handled cat-o'-nine-tails, except that the number of "tails" varies from 3 to 6. Fuckel remarks that in his specimens the "tails" were constantly six (Symb. Myc.

[1] The name Eriospora was also given, in 1851, to a genus of Cyperaceae belonging to tropical Africa.

p. 398); Berkeley considered that there were always four. Cooke's specimens under this name (from Happisburgh) were wrongly determined.

Germ. Denm.

POLYSTIGMINA Sacc. Syll. iii. 622.

Stroma foliicolous, discoid, flatly convex, somewhat fleshy, of a pleasant reddish colour, plurilocular within. Spores filiform, curved or hooked, eseptate, hyaline.

Prunus

Polystigmina rubra Sacc. Syll. iii. 622; Fung. Ital. pl. 1496. All. vii. 315, with fig. Died. p. 703, p. 690, f. 12. Mig. p. 477, pl. 62, f. 2–5. *Septoria rubra* Desm. in Ann. Sci. Nat. 1843, xix. 342. *Libertella rubra* Bon. Handb. 55, note. See Tul. Carp. ii. 76, pl. 8, f. 11, 12.

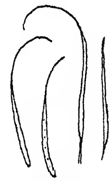

Fig. 57. *Polystigmina rubra*: spores, × 600.

Stromata hypophyllous, roundish, fleshy, convex or rather flat, red, then reddish-fuscous. Pycnidia very minute, numerous, immersed, darker; ostiole punctiform. Spores linear, straight, curved, or somewhat hooked, minutely 6–9-guttulate, 25–30 × 1–1·5μ. (Fig. 57.)

On living leaves of *Prunus spinosa*, *P. domestica*. Bungay; East Bergholt; Thirsk; Whitby; Scarborough; Lampeter; etc. More common near the coast than inland. Aug. Sept.

The pycnidial stage of *Polystigma rubrum* DC. The form on leaves of Almond, in France and Italy, has a darker (brown) stroma.

The spores when first produced are exceedingly slender, not more than 0·4–0·5μ in width, though 20–30μ long, but afterwards (see Tulasne in Carp. ii. 76, pl. 8, f. 12) they become microguttulate, much broader in the lower half, tapering and strongly uncinate in the upper half.

Fr. Belg. Germ. Austr. Ital. India.

FUSIDOMUS Grove, in Journ. Bot. 1929, pp. 201–3; 1934, pp. 269–71, with fig.

Pycnidia subglobose, at length superficial, soft, composed of large loose cells which have a bluish or violet tinge under the microscope; sometimes there is a certain amount of

stroma on which the pycnidia are perched (cf. Stagonostroma, Vol. I, p. 363). Spores fusoid, ± curved or lunulate, somewhat acute at the ends, septate, hyaline or (in mass) roseate; sporophores conspicuous, branched, swollen, hyaline.

The spores resemble those of Fusarium and are, in fact, like some others of that genus, a stage in the development of a pyrenomycete (Gibberella), but enclosed within a peridium, not freely exposed. The stroma belongs rather to the Gibberella. But, as Saccardo says of Gibberella itself (Syll. ii. 552), the "species" here listed might all be called forms of one species.

Plurivorous

Fusidomus Arcus Grove, in Journ. Bot. 1929, p. 202; 1934, p. 269, with fig. *Hendersonia Arcus* B. & Br. in Ann. Nat. Hist. 1850, v. 273. Cooke, Handb. 435. *Stagonospora Arcus* Sacc. Syll. iii. 449. All. vi. 968. ? *Fusarium buxicola* Sacc.

Pycnidia aggregated or subgregarious, at length superficial, subglobose, black, up to 500μ diam.; wall rather thick, of large cells which under the microscope are violet or steel-blue in colour. Spores copious, fusoid, arcuate, thicker in the middle, attenuated at both ends, hyaline, 3-septate, 25–35 $\times$ 4μ; sporophores fasciculate, branched. (Fig. 58.)

On twigs of *Buxus*, Batheaston (B. & Br.). On dead stems of *Arctium Lappa*, Himbleton, Ws. (Rhodes). Heythrop Park, Oxon. Apr.

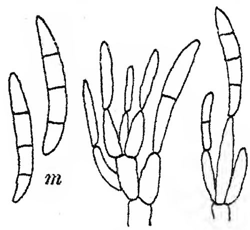

Fig. 58. *Fusidomus Arcus*: mycelium and spores; *m*, two mature spores; × 600.

"Resembling closely in form and colour *Sphaeria pulicaris*,[1] with which it often grows" (B. & Br.).

The cells of the branches or branchlets of the pedicels, just below the spore, are often more or less ampulliform. This fungus is a peculiar development of a Gibberella, being as it were a perithecium of the pyrenomycete that produces within itself the Fusarium-like spores which are normally formed externally as its conidial stage (see Journ. Bot. *ll. cc.*).

Euonymus

Fusidomus Euonymi Grove, in Journ. Bot. 1929, p. 202. *Hendersonia* sp. Sacc. Syll. ii. 556. *Stagonospora Euonymi* Sacc. Syll. iii. 447. All. vi. 973. Died. 555. Mig. 346.

"Spores oblong, reddish in mass, 1–4-septate, 20–24 $\times$ 6μ."

On twigs of *Euonymus*. Norfolk (E. A. Ellis).

[1] Berkeley might have said "*Gibbera Saubinetii*," if he had been writing at a later date.

Identification doubtful, since although the spores agree the tissue of the peridium is not that of Fusidomus. These Fusarium spores seem able to intrude in unexpected ways.

Germ.

Prunus

Fusidomus Pruni, sp. nov.

Pycnidia separate or crowded in little clusters, bursting through the bark and becoming superficial, subglobose or excipuliform, black, 200–300μ diam., pierced at the vertex by a minute round pore; texture soft, semipellucid, bluish-purple. Spores fusoid-oblong, 3-septate, constricted at all the septa, rounded at both ends, hyaline or faintly tinted, 27–30 × 9–10μ, borne on irregular branches of the mycelium which is here and there nodulose.

On thin dead twigs of *Prunus Laurocerasus*, Dinas, Brecon. (Grove & Rhodes). May.

Belongs to *Fusarium Cerasi* R. & F. perhaps?

Sambucus

Fusidomus pulicaris Grove, *l.c.* p. 202. Sacc. Syll. ii. 552 (under Gibberella). Cf. *Fusarium sambucinum* Fckl. Symb. Myc. p. 167, pl. 1, f. 40.

Pycnidia as in the preceding species, but much smaller. Spores oblong-fusoid, curved, 3-septate, constricted at the septa, hyaline, 24–26 × 5–6μ.

On dead stems of *Sambucus nigra*. Walmley, near Sutton Coldfield.

The abnormal pycnidial stage of *Gibberella pulicaris* Sacc. Saccardo calls the spores "macrostylospores (?)", and adds that they are frequently found in a state of germination.

Solanum

Fusidomus Dulcamarae Grove. *Stagonospora Dulcamarae* Passer. in Atti R. Accad. Linc. (Roma), 1889, p. 466. Sacc. Syll. x. 333. All. vi. 988. *Stagonostroma Dulcamarae* Died. p. 561, p. 552, f. 10. Mig. p. 351, pl. 45, f. 2, 3.

Pycnidia scattered or a few together "on a stroma" (Died.), rugose, about 300μ diam., blackish outside, but composed of a pleasantly steel-blue parenchyma within. Spores fusoid, curved, 3–5-septate, faintly constricted, hyaline, 30–40 × 4–7μ.

On a dead stem of *Solanum Dulcamara*. Hadzor Hall, Droitwich. Mar.

The spores were found in a state of germination within the pycnidium. Diedicke mistakenly suggested that this is a pycnidial stage of *Cucurbitaria Dulcamarae* Fr. and in Vol. I, p. 363, it was included among the Hyalophragmiae, where Diedicke had ranged it. But that was a mistake; it is an abnormal state of *Gibberella flacca* Sacc., a form of *G. Saubinetii*, Diedicke's "stroma" belonging to the pyrenomycete. Cf. Grevill. vi. 25.

Germ. Austr. Ital.

Besides these five abnormal states of Gibberella, which have been found in Britain, there are on record indications of three others which might be found here on searching for them:

F. cyanogena Grove, *l.c.*, on *Brassica* in Germany, etc. Winter says (Krypt. Flor. 102): "Stylospores like the ascospores, 3-septate, but smaller, narrower, and more pointed." Belongs to *Gibberella cyanogena* Sacc., which is probably a form of *G. pulicaris*.

F. ficina Grove, *l.c.* Recorded as a part of *Gibberella ficina* by Cooke, from California on bark of *Ficus*, in Grevill. ix. 87. See Sacc. Syll. ii. 556, and cf. *Gibberella baccata*, var. *moricola*.

"Stylospores lanceolate, obtuse, curvulous, 3-septate, hyaline, $30 \times 8\,\mu$" (Cooke).

F. moricola Grove, *l.c.* See Sacc. Syll. ii. 553–4. On *Morus*. Belongs to *Gibberella moricola* Sacc. = *G. baccata*, var. *moricola*. Cf. *Fusarium Urticearum*, Vol. I, p. 187, and *infra*, p. 356.

These short notices are collected here as a help to any student who may come upon one of the rare abnormal states in which Fusarium spores have grown enclosed within peridia (pycnidia or perithecia).

No attempt has been made to correlate these details with those published by Wollenweber in his Die Fusarien (1935), since the two points of view are totally dissimilar.

EXCIPULACEAE

Pycnidia excipuliform (cup-shaped, dish-shaped) or hysterii-form, at first sometimes ± globose, but soon widely open, membranaceous or carbonaceous, pale-coloured or black, erumpent or becoming superficial, glabrous or hairy.

The chief mark of this group is that the excipulum is open almost from the first, or else the upper part of the pycnidium vanishes quite early, leaving the basal portion, which contains the spores, in the shape of a cup, saucer, or plate. They are, as the shape would suggest, for the most part pycnidia of Discomycetes.

Pycnidial stages of the following Discomycetes have been found in Britain (see Phillips' Discom.), but apparently are not yet provided with names: *Encoelia Bloxami*, *Dermatea Cerasi*, *Cenangium seriatum*, *Tympanis alnea*, *T. amphibola*, *T. Aucupariae*, *T. conspersa*, *T. Frangulae*, and *T. laricina*.

Pycnidia at length becoming more or less cup-shaped or saucer-shaped, or so almost from the first.

I. Spores continuous.

A. Pycnidia ± par- or prosenchymatous.

1. Pycnidia flat or convex, glabrous; spores not truly in chains.

a. Spores hyaline.

† Margin of disc glabrous . . . . *Discula*

†† Margin of disc fringed . . . . *Acleistia*

b. Spores somewhat olivaceous . . . . *Crocicreas*

2. Pycnidia ± cup-shaped, not setose; spores concatenate.

a. On wood. Sporophores long and branched.

† Excipulum golden (or purplish) . . . . *Lemalis*

†† Excipulum pale-coloured.

α. Spores acrogenous . . . . *Patellina*

β. Spores pleurogenous . . . . *Pseudopatellina*

b. On lichens. Sporophores shorter; excipulum black . . . . *Sirothecium*

3. Pycnidia furnished with setae.
   - *a.* Spores without appendages . . . . *Amerosporium*
   - *b.* Spores with bristles at each end. . . *Dinemasporium*

B. Pycnidia thick-walled or subsclerotioid.
1. Pycnidia long immersed, opening by laciniae *Sporonema*
2. Pycnidia erumpent.
   - *a.* Pycnidia ± solitary.
     - † Opening by a round pore . . . . . *Excipula*
     - †† Opening by a wide torn margin . . . *Dothichiza*
   - *b.* Pycnidia densely gregarious, rugose . . *Psilospora*

II. Spores uniseptate.

A. Spores colourless or nearly so.
1. Spores simple.
   - *a.* Pycnidia opening by a fissure . . . . *Cystotricha*
   - *b.* Pycnidia opening by laciniae . . . . . *Discella*
   - *c.* Pycnidia opening with a ciliate margin . *Trichocrea*
2. Spores in chains . . . . *Siropatella*

B. Spores pale-olivaceous . . . . *Pseudodiplodia*

III. Spores oblong-fusoid, pluriseptate, faintly curved.

A. Pycnidia solitary or slightly clustered.
1. Pycnidia glabrous . . . . *Excipulina*
2. Pycnidia villose . . . . *Topospora*
3. Pycnidia setose . . . . *Excipularia*

B. Pycnidia densely aggregated . . . . *Pilidium*

IV. Spores filiform or fusoid, curved or falcate, eseptate.

A. Spores continuous, obtuse above . . . . . *Oncospora*

B. Spores septate, tapering upwards. . . . *Heteropatella*

For *Bloxamia*, see *infra*, among MELANCONIALES, p. 268.

DISCULA Sacc. Syll. iii. 674.

Pycnidia discoid or dish-shaped, often imperfect and appearing to be formed by a modification of the matrix, covered by the epidermis, which finally is often torn into segments. Spores ellipsoid, oblong, or subcylindrical, continuous, hyaline.

Allied to Discella, but distinguished by its non-septate spores.

Fagus

Discula Fagi Oud. Contr. Fl. Myc. Pays-Bas, 1889, xiii. 53, in Nederl. Kruidk. Arch. ser. 2, v. 505. Sacc. Syll. x. 433. All. vii. 409. Naturalist, 1905, p. 189.

Pycnidia nestling beneath the periderm, brownish, up to 1 mm. diam., flatly conical, with the peridium imperfectly formed. Spores ovoid-oblong or pyriform, between acute and obtuse at both ends, at times faintly biguttulate, 9–14 × 3–4·5μ.

On dying seedlings of *Fagus silvatica.* Masham, Yorks. (Yorks. Fung. Flor. 370). On branches of the same, Richmond Park; Box Hill (E. W. Mason). Jan.–Jul.

There can be little doubt that this is merely a young, not yet fully developed, form of *Fusicoccum galericulatum* Sacc. (Vol. I, p. 251).

Holl.

Fraxinus

Discula macrosperma Sacc. Syll. iii. 675, var. *Fraxini* Grove, in Journ. Bot. 1912, p. 52, pl. 516, f. 13. Cf. *Discella macrosperma* Peck, in 29th Rep. N.Y. Sta. Mus. p. 49 (on *Salix*).

Pycnidia imperfectly developed, at first veiled by the raised epidermis, then erumpent and cracking it in a radiate or sulcate fashion, globose, black, 500–700μ diam., then umbilicate and finally saucer-shaped. Spores oblong-ellipsoid, straight in face view, curved in lateral view, for a long time hyaline, granular within, then olivaceous, 30–40 × 12–13μ; sporophores filiform, straight, at length 30 × 2·5μ. (Fig. 59 *a–c*.)

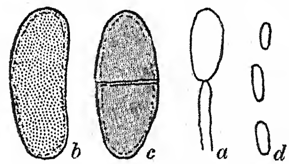

Fig. 59. *Discula*: *D. macrosperma*, var. *Fraxini*; *a*, young spore, × 300; *b*, a full-sized spore, seen in profile, and *c*, a 1-septate spore (*Diplodia*), × 600 (both from the same leaflet); *d*, *D. microsperma*, from Ayrshire, spores, × 600.

On branches of *Fraxinus*, and even on a leaflet with the Diplodia. Cheshire; Warwickshire; etc. Apr.–Nov.

A similar form was found on *Salix* in Cheshire (J. W. Ellis), with spores 25–28 × 9–10μ. Each of these forms is a stage in the growth of the corresponding Diplodia; see *D. inquinans* and *D. salicina*, pp. 42, 58.

N. America.

Juncus

Discula Junci Sm. & Ramsb. in T.B.M.S. 1916, v. 246. Sacc. Syll. xxv. 528.

Pycnidia scattered, numerous, roundish, up to 0·5 mm. wide, dingy-brown or blackish, covered by the raised epidermis, which dehisces by a central opening and is at length burst into fragments and falls off, disclosing a round flat black disc; texture of wall above and below imperfect. Spores oval or roundish, 0·5–1·5μ long; sporophores crowded, simple, hyaline, 5–7 × 1μ.

On culms of *Juncus communis*. Central Scotland—Lanark, Ayr, Inverness, etc. (Boyd). Jul. Aug.

"The dark colour of the pustules is apparently due to the decay of the host-tissue, on which the sporophores are almost directly seated. This fungus seems to be always found on dead rush stems that contain *Sclerotium roseum* (*Sclerotinia Curreyana*); these are conspicuous by their pale yellow colour" (Boyd).

Salix

Discula microsperma Sacc. Syll. iii. 675. Grove, in Journ. Bot. 1886, p. 197. All. vii. 411. Mig. 507. *Discella microsperma* B. & Br. in Ann. Nat. Hist. 1850, v. 378, pl. 12, f. 8 *e*. Cooke, Handb. 463.

Pycnidia lens-shaped, covered by the epidermis, 300–500μ diam. (but occasionally reaching 1 mm.), blackish, then black when open in the centre and surrounded by the laciniae of the epidermis. Spores oblong or subclavulate, rounded at the ends, 5–7 × 1–1·5μ, oozing out as a pallid-yellowish globule which soon becomes black; sporophores filiform, 8–10 × 1–1·5μ, rising from a dense dark-olivaceous stratum. (Fig. 59*d*.)

On dead twigs of *Salix* (*aurita*, *cinerea*, *fragilis*, *viminalis*, etc.). King's Cliffe (Berk.). Bath, etc. (Broome). Jedburgh (Jerdon). Ayrshire (Boyd). Warwickshire, Worcestershire, Staffordshire. Dec.–Jun.

In my specimens the spores were mostly linear, sometimes curved, 4–6 × 1μ; in Berkeley's they are larger and subclavulate. On the same osier basket, at Sutton Coldfield, I found *Discella carbonacea* and *Diplodia salicina* Lév. with the Discula.

As the pustules of the Discula become more prominent, they open in the centre by a minute crack, which widens gradually and at

length leaves a black disc surrounded by the broken edges of the epidermis. Diedicke (p. 801) suggests that *Myxosporium melanotrichum* Sacc. (*q.v. infra*, p. 256) is a form of the same species, but with more fusoid or ovoid spores, reaching up to 2 μ in width (but?). *Discella carbonacea*, however, belongs without doubt to the same cycle as the Discula. See Tul. Carp. ii. 170, and *infra*, p. 148.

Fr. Germ. Denm. U.S.A.

ACLEISTIA Bayliss Elliott (*l.c.*).

Pycnidium excipuliform, open from the beginning, composed of dark-olive interwoven hyphae, margin fringed with hairs. Spores roundish, colourless, continuous.

Alnus

Acleistia alniella Bayliss Elliott, in T.B.M.S. 1917, v. 420, pl. 7, f. 18, 19, 21 *b*. Sacc. Syll. xxv. 530.

Pycnidia gregarious, superficial, excipuliform, open from the first, round, 200–250 μ diam.; texture of dark-olive inter-

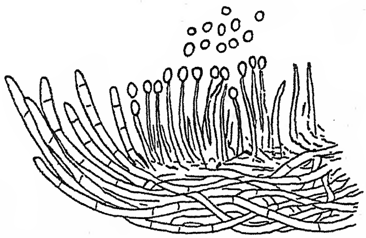

Fig. 60. *Acleistia alniella*: section through margin of excipulum showing fringe of hairs, and loose spores, ×600 (after Elliott).

woven septate hyphae which pass at the margin into a fringe of colourless hairs. Spores colourless, roundish-oval, 2–2·5 × 2 μ; sporophores subulate, simple, 12–15 μ long, bearing the spores at the apex. (Fig. 60.)

On female catkins of *Alnus glutinosa*. Windmill Naps, Tanworth-in-Arden, Wk. Dec.

The conidial stage of *Ombrophila alniella* (Nyl.) Boud., in company with which it occurred; when young the two stages look almost exactly alike.

CROCICREAS Fr. Summ. Veg. Sc. p. 418.

Pycnidia free, cupulate or turbinate, between fleshy and horny, composed within and without of floccose fibres, the mouth becoming umbilicate. Spores oblong or cylindrical, hyaline or pale olivaceous, seeming to lie in chains on branched filiform sporophores.

Gramineae

Crocicreas atroviride v. Höhn. in Ann. Mycol. 1903, i. 403. Died. p. 738, p. 718, f. 2. *Myxormia atroviridis* B. & Br. in Ann. Nat. Hist. 1850, v. 457, pl. 12, f. 9. Cooke, Handb. p. 459, f. 172. Sacc. Syll. iii. 734. Cf. *Crocicreas gramineum* Fr. Summ. Veg. Sc. 418. Sacc. Syll. iii. 183. All. vi. 415.

Pycnidia cup- or shield-shaped, erumpent, then superficial, scattered, minute, smooth, composed of long closely packed rows of cells. Spores linear-oblong or cylindrical, appearing concatenate, generally biguttulate, somewhat olivaceous, involved in mucus, $12 \times 2\mu$; sporophores crowded, filiform.

On fading or dead leaves of a Grass. Batheaston (Broome). Dec. Jan.

I have examined several specimens of the original gatherings. They now form shallow patelliform cups, $300–500\mu$ diam., surrounded by a narrow erect or incurved black border, composed of filiform dark-olive parallel hyphae. The colour of the hymenium is dark-green ("invisible" green), and all that remains of it is a mass of spores, each fusiform-cylindrical, acute at both ends, continuous, eguttulate, pale olive-green in mass, $9–12 \times 2–2{\cdot}5\mu$. The "isthmuses" mentioned in the original description have vanished; they were probably nothing more than threads of the mucus. The sporophores are filiform, 2μ broad, multiguttulate or indistinctly septate, fasciculate, of the same colour as the spores, and $30–50\mu$ long.

There seem to have been only two gatherings, Dec. 1858 and Jan. 1859, at Batheaston on leaves of "*Aira caespitosa*"; for Mr Broome, recognising the remarkable character of the species, paid a second visit to the same spot. The species recorded under the same name, on *Rubus*, from North America, is very different; but Fries' *C. gramineum*, on *Holcus*, has identical spores, and differs only in its stouter and subdichotomous sporophores, and in its at first yellowish colour.

Germ.

LEMALIS Fr. Summ. Veg. Sc. p. 360 (*non* Mont.).

Excipula cup-shaped or somewhat urn-shaped, fleshy or membranaceous, margined, greyish-purple or golden. Spores globose or oblong, concatenate.

Allied to the Nectrioideae; cf. Patellina and Pseudopatellina, *infra*.

Pinus

Lemalis aurea Sacc. Syll. iii. 672. All. vii. 407. Elliott & Stansf. in T.B.M.S. 1923, viii. 252, f. 4. *Catinula aurea* Lév. in Ann. Sci. Nat. 1848, ix. 248. *Dendrodochium citrinum* Grove, in Journ. Bot. 1886, p. 18, pl. 267, f. 8. Sacc. Syll. iv. 652.

Excipulum lemon-yellow, urn-shaped with a spreading rim, very fragile, shining outside, about 1 mm. high and broad; margin coarsely dentate with groups of hairs. Spores very numerous, globose, hyaline, yellow, 1·5–2 μ diam., concatenate, involved in mucus; sporophores long, cylindrical, branched, about 0·75 μ wide, each producing a whorl of four branches at the apex. (Fig. 61.)

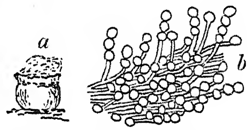

Fig. 61. *Lemalis aurea*: *a*, excipulum, × 10; *b*, spores and sporophores, × 600 (after Elliott and Stansfield).

On cones of *Pinus silvestris*. Tanworth-in-Arden (Bayliss Elliott). On wood of the same, Barnt Green, Ws. Sept.

The excipula are at first very shallow, yet producing an abundance of spores. When dry, resembles *Calloria chrysocoma*.

Fr.

PATELLINA Speg. Fung. Argent. III, no. 164. Sacc. Syll. iii. 622.

Excipula between cup-shaped and saucer-shaped, fleshy, glabrous (? always), sessile, bright-coloured. Spores globose, ellipsoid, or cylindrical, unicellular, hyaline, growing in chains at the apex of long cylindrical hyphae.

Probably both the species recorded here are pycnidial stages of Discomycetes. Saccardo afterwards placed this genus among the Hyphomycetes (Syll. iv. 677), to which it seems to be closely allied.

Pinus

Patellina caesia Elliott & Stansf. in T.B.M.S. 1923, viii. 250, f. 2.

Excipulum patelliform, like the apothecium of a discomycete, grey, pubescent, about 1 mm. broad. Spores cylindrical, hyaline, more or less obliquely truncate at both ends, about $10 \times 1{\cdot}5\mu$; sporophores fasciculate, branched, cylindrical, producing long chains of spores. (Fig. 62.)

On cones of *Pinus silvestris*. Tanworth-in-Arden, Wk.

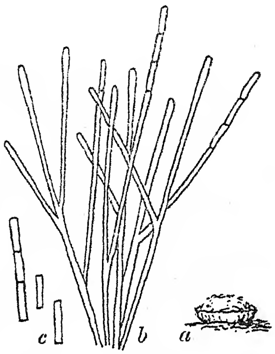

Fig. 62. *Patellina caesia*: *a*, excipulum, ×15; *b*, sporophores and *c*, loose spores, ×600.

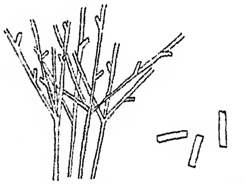

Fig. 63. *Patellina diaphana*; spores and sporophores, ×600 (after Elliott).

Populus

Patellina diaphana Elliott & Stansf. in T.B.M.S. 1923, viii. 251, f. 3.

Excipulum like that of *P. caesia*, but glabrous and entirely white. Spores similar, but not in such long chains, $5\text{–}6{\cdot}5 \times 1\text{–}1{\cdot}5\mu$; sporophores long. (Fig. 63.)

On dead roots of *Populus*. Tanworth-in-Arden, Wk.

PSEUDOPATELLINA v. Höhn. Fragm. Myk. no. 179.

Pycnidia immersed, then erumpent, soft, pale, fleshy-membranaceous, at length opening above and becoming dish-shaped. Spores continuous, borne laterally on long filiform, branched and anastomosing, sporophores which fill nearly the whole of the cavity.

It is allied to Pseudopatella Sacc. and like that is a pycnidial stage of a Discomycete. Cf. under Cystotricha, *infra*, p. 145.

Pinus

Pseudopatellina conigena v. Höhn. in Sitz-ber. Akad. Wiss. Wien, 1908, cxvii. 1024. Mig. 470. *Dacryomyces conigenus* Niessl, in Raben. Fung. Eur. no. 2628. *Dendrodochium album* Bayliss Elliott, in T.B.M.S. 1920, vi. 57, f. 8–11. (? Bon. Handb. p. 287. Sacc. Syll. iv. 653.)

Pycnidia whitish, brownish when dry, immersed, then erumpent, 200–400 μ broad, roundish, thin, fleshy, flat, opening above, becoming patelliform. Spores globose or ellipsoid, smooth, colourless, $2\cdot5\,\mu$ diam. or $3 \times 1\cdot5\,\mu$, immersed in mucus; sporophores branched, anastomosing, hyaline, about $2\,\mu$ thick, bearing the spores in large numbers. (Fig. 64.)

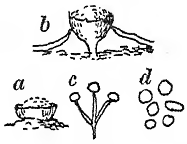

Fig. 64. *Pseudopatellina conigena*: *a*, excipulum, ×50; *b*, section of the same, ×60; *c*, spores and sporophores, ×360; *d*, spores, ×600 (after Elliott's *D. album*).

On fallen cones of *Pinus silvestris*. Tanworth-in-Arden, Wk. Nov. Dec.

Probably the pycnidial stage of *Propolis rhodoleuca*, with which in Austria it is found in abundant association. Von Höhnel wrongly places it among the Nectrioideae.

"In a damp atmosphere the spores accumulate above the hymenium and swell up to form a whitish column, which ultimately topples over" (Elliott).

Germ. Austr.

SIROTHECIUM Karst. Symb. Myc. xx, p. 105.

Pycnidia erumpent and becoming superficial, subglobose or elongated, between carbonaceous and membranaceous, glabrous, black, at length dehiscing irregularly. Spores globose, continuous, olivaceous, arising in short chains at the apex of simple caespitose sporophores.

Lichens

Sirothecium lichenicola Keissler, in Oesterr. Bot. Zeitschr. 1910, lx. 56. Smith, in T.B.M.S. 1911, iii. 283. Mig. 260. *Torula lichenicola* Lindsay, Obs. New Lich. Micr. Fung. in Trans. Roy. Soc. Edin. xxv. 515–18, pl. 23, f. 1–18. Sacc. Syll. x. 574. Lindau, viii. 577.

Pycnidia ± globose, punctiform, immersed, then erumpent and open above, black. Spores in short chains of 2–4, oblong-cuboid, greyish-green or olive-brown, often with two small guttules, $6\text{–}8 \times 3\text{–}4\,\mu$ ($7\text{–}12 \times 4\,\mu$, Keissl.); sporophores caespitose, pallid, growing gradually wider upwards. (Fig. 65.)

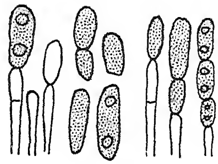

Fig. 65. *Torula lichenicola*: a selection from Lindsay's numerous sketches of the spores and sporophores, × 600.

Parasitic on the apothecia and thalli of *Lecanora subfusca*, *L. rugosa* subsp. *chlarona*, *Lecidea*, etc. Ireland, said by Lindsay to be common; less so in Great Britain. *n.v.*

Lindsay records it on Lichens belonging to many other corticolous genera, but with spores varying much in size. On *Lecanora subfusca*, he says, in Ireland it frequently makes the hymenium appear completely black. He gives the ordinary length of the spores as about $6\text{–}7\,\mu$, but from his plate they seem often to be larger, even as long as $18\,\mu$. Keissler states that the spores ultimately become 1-septate (his var. *bispora*).

It appears to me to be very doubtful if it is a Coelomycete, but if it is it should be placed in the Excipulaceae rather than in any other section.

Germ. Austr.

AMEROSPORIUM Speg. Fung. Arg. IV, no. 306.

Pycnidia ± cup-shaped and setulose, like those of Dinemasporium. Spores simple, between subfusoid and cylindrical, curvulous, without appendages.

Distinguished from Dinemasporium by the absence of bristles on the spores.

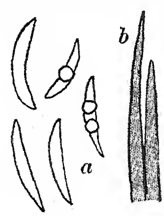

Fig. 66. *Amerosporium Armeriae*: *a*, spores, some fresh, some partly dry, × 600; *b*, hairs of the excipulum, × 300.

Armeria

Amerosporium Armeriae Henn. Einig. Sachs. ges. Sphaer. 1904, p. 433. Sacc. Syll. xviii. 439. Mig. 512.

Pycnidia epiphyllous or amphigenous, scattered or subgregarious, erumpent, at length superficial, somewhat cup-shaped or discoid, membranaceous, black, 120–$150\,\mu$ broad, surrounded by subulate black subacute bristles,

which are rigid, 50–120μ long, 4–6μ thick. Spores fusoid, acute or subobtuse at both ends, curvulous, cloudy within or with one or two oil-drops, colourless, 20–25 × 3–4μ. (Fig. 66.)

In the grooves on the upper side of dead shrivelled leaves of *Armeria maritima*, on the cliffs, Budleigh Salterton, Devon (Rhodes). Mar.

When the spores are shrivelled, the oil-drops remain orbicular and form a swelling in the spores, as in the figure. Previously found only in Oberlausitz.

Euphorbia

Amerosporium congregatum Sacc. Syll. iii. 681. All. vii. 419. *Excipula congregata* Cooke, in Grevill. iii. 178 (1875).

Pycnidia gregarious, forming dark patches on the stems, immersed, up to 500μ long, clothed with stiff erect black bristles which burst through the cuticle. Spores linear, obtuse, curvulous, 20–22 × 3–4μ.

On dead stems of *Euphorbia silvatica*. Darenth (Cooke). Apr.

This has exactly the look of a Vermicularia, which it probably is; the spores would be better described as lunate-fusoid, somewhat obtuse at the ends.

Fraxinus

Amerosporium chaetostroma Sacc. Syll. iii. 682. All. vii. 419, with fig. *Excipula chaetostroma* B. & Br. in Ann. Nat. Hist. 1850, v. 456, pl. 11, f. 2. Cooke, Handb. 458.

Pycnidia gregarious, crowded, convex, cinereous-black, about 250μ diam.; disc everywhere penetrated and roughened by long eseptate black bristles. Spores lunate-fusoid, acute at both ends, pale, the contents granular and greenish; sporophores fasciculate or connate, rather long.

On dead samaras of *Fraxinus*. Leigh Woods, Somerset (Bucknall).

Saccardo's statement "in ramis emortuis Fraxini" is merely a mistranslation of Berkeley and Broome's description "on dead keys of Ash". But it is a doubtful species.

Rosa

Amerosporium patellarioides Sm. & Ramsb. in T.B.M.S. 1918, vi. 52. Sacc. Syll. xxv. 529.

Pycnidia superficial, subglobose or ellipsoid, 300–500μ wide, at length when dry collapsing and becoming patelli-

form, flat, brown, surrounded by rather sparse hairs; hairs erect, septate, brown, up to $250 \times 10\mu$, obtuse and subhyaline above. Spores cylindric-fusoid, $8–10 \times 2\mu$; sporophores slender, branched.

On fallen leaves of *Rosa canina*, *R. rugosa*, and *R. spinosissima*. Kilwinning and Seamill, Ayrshire (Boyd). Jan.

"The peridium is composed of rusty-brown, strong-walled cells. The whole pycnidium is swollen when moist, and collapses to a concave form when dry. May be identical with *A. chaetostroma* Sacc." (Sm. & Ramsb.). The size of the pycnidium given in T.B.M.S. is a slip of the pen.

Ulex

Amerosporium macrotrichum Sacc. Syll. iii. 681. All. vii. 420. *Excipula macrotricha* B. & Br. in Ann. Nat. Hist. 1850, v. 456. Cooke, Handb. 458.

Pycnidia large, surrounded by coarse hairs; hairs long, $230–810 \times 12–15\mu$, thick, straight, with two coats, the outer separating easily from the inner. Spores lunulate-fusoid, $5–6\mu$ long.

On dead branches of *Ulex europaeus*. Forres (Rev. J. Keith).

No spores could be found on examination of the original specimen. Hairs nearly 1 mm. long, surrounding a flat disc 1–2 mm. broad. The peculiarity of the hairs mentioned in the description is not now apparent. A mere form of a Vermicularia?

Wood

Amerosporium corvinum Sacc. Syll. iii. 682. All. vii. 421. ? *Peziza corvina* Pers. Myc. Eur. i. 248. *Excipula corvina* Fr. Summ. Veg. Sc. 403. *Vermicularia corvina* Karst. & Har. in Journ. Botanique, 1890, p. 359. Sacc. Syll. x. 225. All. vi. 510. See also Died. 751, under *Dinemasporiopsis hispidula*.

"Pycnidia scattered, nestling in the wood, then superficial, round, gently flattened, black, about 200μ diam., beset with straight eseptate black bristles, $85–100 \times 8\mu$, which diverge in all directions, pierced by an ostiole which (when moist) is pretty broad. Spores rodlike or fusoid, curvulous, continuous, $20–22 \times 2–3\mu$; sporophores $70–80 \times 0{\cdot}5\mu$" (Karst. & Har.).

On chips of wood. Queen's Cottage, Kew (Nicholson). Sept.

The spores of these Kew specimens are rounded at the ends, rarely not quite straight, but hardly ever fusoid; they are like those of a

typical Ceuthospora. The definite pycnidia are 250–330μ wide; the very numerous bristles are paler than usual and distinctly septate. It is possible, but not quite certain, that Persoon's species is the same as that of Karsten and Hariot. But the single British specimen seems to be different from either of them.

Germ. Ital.

Amerosporium epixylon Grove. *Vermicularia epixyla* Fr. Summ. Veg. Sc. 420. Sacc. Syll. iii. 223. All. vi. 494.

Pycnidia minute, immersed, then superficial, numerous, thickly scattered, round or elongated, convex, black, beset with scattered straight bristles of the same colour, irregularly pierced at the summit. Spores oblong or ovoid-oblong, acute at the ends.

On wood of dead branches. Kew Gardens (Cooke).

Belg. Holl. Swed. (on wood of *Abies*).

DINEMASPORIUM Lév. in Ann. Sci. Nat. 1846, v. 274.

Pycnidia cup-shaped, superficial, black, beset with stiff fuscous setose hairs. Spores oblong or sausage-shaped, continuous, hyaline, with a delicate bristle at each end; sporophores linear, rarely branched.

Polynema Fr. is a similar plant with several bristles at each end of the spores.

Plurivorous

Dinemasporium herbarum, nov. comb. Cooke, Handb. 459 (as var. of *D. graminum*). Sacc. Syll. iii. 685, and All. vii. 425 (as var. of *D. hispidulum*).

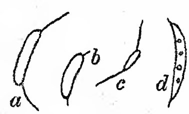

Fig. 67. *Dinemasporium*: *a*, *D. graminum*; *b*, *D. herbarum*; *c*, *D. fimeti*; *d*, *D. hispidulum*; spores, all × 600.

Pycnidia often a little larger than in *D. graminum* or in *D. hispidulum*. Spores allantoid, 11–14 × 2·5–3μ, with a very short oblique bristle at each end. (Fig. 67*b*.)

On dead stems of *Urtica dioica* and other herbaceous plants, e.g. *Labiatae, Humulus, Senecio Jacobaea, Silene, Pteridium,* etc. Highgate; King's Lynn; Warwickshire; Staffordshire; Cheshire; Yorkshire; Ayrshire; Argyllshire; Aberdeen. Spring.

The spores on Cooke's own specimen measured $10–14 \times 1·5–2 \mu$, with bristles less than 2μ long.

Denm. Ital. N. Amer.

Gramineae

Dinemasporium strigosum Sacc. in Mich. ii. 281; Syll. iii. 683; xi. 560. All. vii. 426. Died. 742. *Peziza strigosa* Fr. Syst. Myc. ii. 103. *Excipula strigosa* Corda, Ic. Fung. iii. 29, pl. 5, f. 78. Cooke, Handb. p. 457, f. 170.

Pycnidia between immersed and sessile, flattened, concave, strigose, black; disc pallid. Spores fusoid-falcate, acute at both ends, curved, guttulate, $25–30 \times 3–4 \mu$, furnished at each end with a short bristle $4–5 \mu$ long.

On culms and leaves of Grasses. Appin (Carmichael). Forden (Vize).

The specimens usually found in herbaria under the name "*strigosum*" are a mixture of *D. graminum* with other species of that genus, and other genera of a quite different character. Saccardo's variety *leptosporum* (iii. 683) is described as having spores $16–18 \times 1·5–2 \mu$, with four guttules. There seems to be no essential difference between *D. strigosum* and *D. graminum* except in the length of the spores, and of the terminal bristles which are much longer in the latter species. See a note by Saccardo, in Grevill. xxi. 68, on the confusion between the two.

Gramineae and **Cyperaceae**

Dinemasporium graminum Lév. in Ann. Sci. Nat. 1846, v. 274. Cooke, Handb. p. 458, f. 171. Sacc. Syll. iii. 683. All. vii. 421, with fig. Died. p. 742, p. 718, f. 5. Mig. p. 513, pl. 67, f. 1–4. *Excipula graminum* Berk.

Pycnidia scattered, up to 500μ broad, somewhat cup-shaped, very black, setose; setae simple, black, paler at the apex, $200–400 \times 8–12 \mu$. Spores falcate-fusoid, obtuse at the ends, $12–20 \times 2·5–3 \mu$, furnished at each end with an obliquely placed bristle, $12–15 \mu$ long. (Fig. 67*a*.)

On dead culms and leaves of Grasses and Sedges. Common: England, Wales, Scotland. Mar.–Sept.

Var. **strigosulum** Karst. in Hedwig. 1884, p. 21.

Spores sausage-shaped or ellipsoid, slightly curved, $9–12 \times 2–3 \mu$; bristles $6–8 \mu$ long.

Europe, N. and S. Amer., Cuba, East Indies, New Zealand.

Wood

Dinemasporium hispidulum Sacc. in Mich. ii. 281; Syll. iii. 685; Fung. Ital. pl. 1494. All. vii. 424, with fig. *Peziza hispidula* Schrad. in Journ. Botanik, 1799, ii. 64. *Dinemasporiella hispidula* Bub. & Kab. in Hedwig. lii. 358. Mig. p. 516, pl. 67, f. 10–13 (not *Dinemasporiella* Speg.). *Dinemasporiopsis hispidula* Bub. & Kab. *in litt. apud* Died. p. 750, p. 718, f. 10.

Pycnidia scattered or gregarious, up to 1 mm. broad, of the shape of a shallow cup, with edges rolled in when dry, black, provided with long (up to 300μ) dark rigid straight, hardly septate, setae; disc becoming glaucous. Spores elongate-fusoid, curvulous, hyaline, 3–4-guttulate, $14–18 \times 2{\cdot}5–3\mu$, furnished at each end with a short (2μ) oblique bristle; sporophores straight, filiform, $1{\cdot}5\mu$ thick, about as long as or longer than the spore. (Fig. 67*d*.)

On dead wood and chips. Common: England, Scotland.

Nov.–May.

This is the usual form on wood. The spores are said to be at length 1-septate, which is the basis of the genus Dinemasporiopsis.

Fr. Belg. Holl. Germ. Denm. Ital. Swed. U.S.A. India.

Dung

Dinemasporium fimeti Ph. & Pl. in Grevill. iv. 119, pl. 62, f. 1. Sacc. Syll. iii. 686. All. vii. 627. Died, p. 743, p. 718, f. 6.

Pycnidia roundish, superficial, about 500μ broad, black, surrounded by stiff opaque black pointed setae which are $300–400\mu$ long. Spores cylindric-fusoid, curved, $7–9\mu$ long, 2μ broad, with a bristle at each end, which is obliquely placed and of about the same length. (Fig. 67*c*.)

On dung of Rabbits. Spye Park, Wiltshire (Broome). King's Lynn (Plowright). Mollington, Cheshire (Travis).

"Differs from *D. graminum* in its compacter and smaller pycnidia, and its smaller spores" (Ph. & Pl.). But in Mr Travis's specimens on dung of Rabbits the spores were as long as those of *D. graminum*.

Germ. (on stems of Lupin, growing near rabbits' dung).

SPORONEMA Desm. in Ann. Sci. Nat. 1847, viii. 182.

Pycnidia covered by the epidermis, afterwards erumpent, at first closed, then dehiscing and becoming excipuliform; spore-mass at length discoid, rather soft. Spores ovoid or cylin-

drical, continuous, hyaline; sporophores filiform, frequently branched.

Somewhat similar to Phacidium when mature, but bearing pycnospores instead of asci; when young it may easily be mistaken for a Phoma. For *Sporonema strobilinum*, see Discella, *infra*, p. 146.

Medicago

Sporonema phacidioides Desm. in Ann. Sci. Nat. 1847, viii. 182. B. & Br. in Ann. Nat. Hist. 1881, vii. 129. Sacc. Syll. iii. 677. All. vii. 414. Died. 744. *Phyllosticta Medicaginis* Sacc. Syll. iii. 42, *p.p.* ? *Ascochyta Medicaginis* Fckl. Symb. Myc. 388. See U.S. Dept. Agric. Bull. no. 759.

Pycnidia epiphyllous, numerous, scattered, minute, roundish, flattened, dark-brown, soon splitting into 4 or 5 unequal obtuse segments; disc nearly plane, cinnamon. Spores ovoid-oblong, biguttulate, $5–7 \times 1{\cdot}5–2\,\mu$; sporophores filiform, fasciculate, $20–25 \times 1\,\mu$.

On fading leaves of *Medicago maculata*. Wimbledon.

Summer.

The spores are exactly like those of many species of Phyllosticta. It is the pycnidial stage of *Pyrenopeziza Medicaginis* Fckl. (*non* Sacc.) = *Pseudopeziza Jonesii* Nannf., but I think the Wimbledon specimens have been wrongly referred to it: *Ps. Medicaginis* (Lib.) Sacc. is different: see pp. 227, 358.

Fr. Belg. Germ. U.S.A. (on *M. sativa*).

EXCIPULA Fr. Syst. Myc. ii. pp. 190, 596, emend.

Pycnidia immersed, then erumpent, excipuliform or cup-shaped, membranaceous or subcoriaceous, black, glabrous, opening with a circular mouth. Spores oblong or elongate, continuous, hyaline; sporophores various.

This is a confused and doubtful genus.

Prunella

Excipula Prunellae Lind, Dan. Fung. 1913, p. 470. *Asteroma Prunellae* Purton, MS. in Berk. Eng. Flor. v. 289. Baxt. Crypt. Oxon. no. 79. Cooke, Handb. 460. Sacc. Syll. iii. 210. Desm. in Ann. Sci. Nat. 1841, xv. 140. (See All. vi. 455, and in Hedwig. 1895, p. 263. Sacc. Syll. xiv. 902. Died. 217. Mig. 135.)

Fibrils amphigenous, straight, black, radiating in bundles and forming black rosettes 1–3 mm. diam. Pycnidia seated

in the centre, mostly epiphyllous, usually solitary, coriaceous, disciform, black. Spores elongated, straight or slightly curved, hyaline, eguttulate, about $6 \times 2\mu$ ($6–12 \times 2{\cdot}5–4\mu$, Allesch.); sporophores short.

On living green leaves and petioles of *Prunella vulgaris*. Bagley Wood and Shotover Hill (Baxter). Bulmer, Yorks. (Massee). Norfolk (Plowright). Cheshire (Ellis), in company with *Ephelina Prunellae*. Ayrshire (Boyd). Aberdeen; Tay; etc. (Trail).

The pycnidial stage of *Beloniella Prunellae* Lind (*Ephelina Prunellae* Phill.). Aug.–Apr.

Desmazières records it on the stems and calyces also. Berkeley says (Eng. Flor. *l.c.*) that it has the appearance of a minute alga "Hutchinsia" (i.e. *Polysiphonia elongata*), "spread out upon the leaf with its knob-like root in the centre". Roberge says that it resembles a fragment of Oscillaria which has grown and dried upon paper. Dr Ellis's specimens present fine examples of the ascophorous stage, mingled with the Excipula.

Allescher suspected that the fungus to which he gives the name, which he found frequently in Bavaria in company with *Septoria Trailiana*, is not exactly the same as the fungus found by Purton and issued by Baxter.

Fr. Belg. Germ. Denm. Port.

Serratula

Excipula Serratulae Grove, in Journ. Bot. 1932, p. 4, pl. 599, f. 9. *Phoma Serratulae* Allesch. in Allgem. Bot. Zeitschr. 1895, no. 3. Raben. Krypt. Flor. vi. 321. Sacc. Syll. xi. 490. Died. 174. Mig. 79. Petrak, Fung. Pol. exs. no. 480!

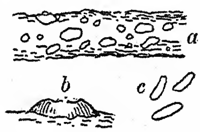

Fig. 68. *Excipula Serratulae*: *a*, stem of *Serratula*, showing the habit of the fungus, $\times 5$; *b*, an excipulum seen in profile, $\times 30$; *c*, spores, $\times 600$.

Pycnidia gregarious, covered by the epidermis, round or oval, black, somewhat shining, up to $250 \times 180\mu$, collapsing and becoming somewhat saucer-shaped, opening by a large pore $40–50\mu$ wide, incurved round the edge of the pore and disclosing a round pallid or yellowish disc; wall parenchymatous, thickish, dark-brown, with cells $5–9\mu$ wide. Spores cylindrical, often slightly curved, obtuse at both ends, hyaline, $5–7 \times 1–1{\cdot}5\mu$ ($8–10 \times 2\mu$, Allesch.). (Fig. 68.)

On dry dead stems of *Serratula tinctoria*, of the previous year, Defford Common, Ws. (Rhodes). Aug.–Nov.

Petrak's specimen of *Phoma Serratulae,* Fung. Pol. exs. no. 480, exactly agrees. Dr Rhodes gathered a number of the stems in Nov. 1928, and stored them in a suitable damp place at Oscott College until the end of April, 1929; during this time more of the pycnospores were produced, and the closely compacted sclerotioid mass which nearly filled the pycnidium in October became loosened and densely charged with oil drops. The fungus was evidently engaged in the process of becoming ascigerous, as can be seen in many similar Pyrenomycetes, but no traces of asci were to be found. It must be a fungus of unusually slow development.

Bavaria, Poland, Italy.

Tilia

Excipula petiolicola Fckl. Symb. Myc. 400. Sacc. Syll. iii. 667. All. vii. 401. Mig. 506.

"Pycnidia scattered, minute, hemispherical or oblong, when dry cup-shaped, black."

On dry petioles of *Tilia*. Scarborough; Ringstead. Apr.

A very doubtful species. The spores seem to be quite unknown; none could be found in any of the specimens examined. Fuckel's specimens (Fung. Rhen. no. 1963) were on petioles of *Populus tremula,* and Rehm's were on petioles of *Tilia.*

Germ.

DOTHICHIZA Lib. in Herb., Roum. & Speg. Rel. Lib. I, no. 627.

Pycnidia erumpent, roundish, separate, at first closed, then dehiscing widely and ± cup-shaped. Spores oblong or subcylindrical, continuous, hyaline.

Considered to be the pycnidia of the genus Cenangium.

Coniferae

Dothichiza ferruginosa Sacc. Syll. iii. 672. All. vii. 405. Died. p. 747, p. 718, f. 8 (lower). Mig. 508.

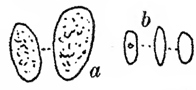

Fig. 69. *Dothichiza*: *a*, *D. turgida*; *b*, *D. ferruginosa*; spores, × 600.

Pycnidia gregarious, erumpent, minute, substipitate, orbicular, plane or umbilicate, black, at first closed, then opening with a torn margin, up to 1 mm. diam. Spores fusoid or narrowly ovoid, 8–9 × 2–3 μ (on Larch cones), ovoid oblong, 8–12 × 4 μ (on *Pinus*). (Fig. 69*b*.)

On branches of *Pinus silvestris*. King's Lynn; Shrewsbury, etc. On *Larch* cones (f. *Laricis*), Bridlington.

The pycnidium of *Cenangium Abietis* Rehm = *C. ferruginosum* Fr., in close association with which it is found. Nannfeldt seems to assert (Studien, p. 312) that *Sclerophoma pithyophilla* v. Höhn. is the same fungus on the leaves.

Germ.

Corylus

Dothichiza turgida v. Höhn. Frag. Myc. 341. Died. p. 747, p. 718, f. 7 (lower). *Excipula turgida* Fr. Syst. Myc. 180. *Catinula turgida* Desm. Exs. no. 1818; and in Ann. Sci. Nat. 1852, xviii. 374. Sacc. Syll. iii. 673. All. vii. 408. Mig. 506.

Pycnidia between obconic and cylindrical, afterwards compressed, gregarious, black, firm, opening by a wide mouth surrounded by a neat margin; texture of parallel olivaceous-fuscous cells, with a grey disc. Spores oblong-ellipsoid, rounded at both ends, hyaline or yellowish, guttulate, $18–20 \times 8–9\mu$; sporophores linear, hyaline, $16–18 \times 3–4\mu$. (Fig. 69*a*.)

On bark of branches of *Corylus Avellana*, near Petersfield. *n.v.* May.

The pycnidial stage of *Cenangium Coryli* Corda, according to Saccardo, but this Cenangium seems not yet to have been found in Britain.

Fr. Germ. Switz. Ital. Swed. Finland, N. America.

PSILOSPORA Raben. in Hedwig. i. 107.

Pycnidia immersed, then superficial, oblong or indefinite in shape, tending often to be bilabiate, between membranaceous and carbonaceous, usually densely gregarious on living or dying bark. Spores rare, ellipsoid or oblong, continuous, hyaline; sporophores linear.

The species of this genus are considered to be the pycnidia of species of *Dichaena*, which they resemble in habit, and in company with which they are found. See Massee, Fung. Flora, iv. 43; Roper in Grevillea, iii. 45; and Berkeley in Engl. Flor. v. 294.

Fagus, Corylus

Psilospora faginea Raben. Herb. Myc. II. 450; Hedwig. i. 107, with plate. Cooke, Handb. 932. Sacc. Syll. iii. 680. All. vii. 417. Died. p. 750, p. 718, f. 9 (lower). Mig. 511. *Hysterium rugosum* (α *Dichaena faginea*) Fr. El. Fung. ii. 143. Sacc. Syll. ii. 771.

Pycnidia rather large, oblong, erumpent, distinct, at length confluent, forming effused rugulose black patches. Spores ellipsoid, sometimes guttulate or perfectly hyaline, 18–20 × 14–15 μ; sporophores linear, crowded in fascicles, colourless except at base, 30–60 × 2 μ.

On smooth living bark of *Fagus silvatica*. Probably very common, but spores are rarely found. Guildford; Epping; New Forest; Edgbaston Park, Birmingham; Worcestershire; Tal-y-Bont, Merioneth; etc. Autumn.

A pycnidial stage of *Dichaena faginea* Fr. Outwardly it resembles a black corticolous lichen rather than a fungus, and was often reckoned as a state of an Opegrapha. The spores are mostly found in the youngest non-connate pycnidia.

Var. **corylea** Fr. *Hysterium rugosum* (γ *Dichaena corylea*) Fr. *l.c.*

Pycnidia slightly smaller. Rugulose patches very conspicuous, one inch wide or more.

On fallen branches of *Corylus Avellana*. Randan Woods and Hartlebury Common, Ws.; etc. Rather common in the Midlands and probably elsewhere, but almost always barren.

There is what is possibly a form of it to be found on living branches of *Salix Caprea*.

Europe, N. America.

Quercus

Psilospora Quercus Raben. in Fckl. Symb. Myc. 401. Sacc. Syll. iii. 680. All. vii. 418. Mig. 512. *Hysterium rugosum* (β *Dichaena quercina*) Fr. El. Fung. ii. 143, *p.p.* Sacc. Syll. ii. 771. *Psilosporina Quercus* Died. p. 756, p. 754, f. 6.

"Pycnidia somewhat smaller and flatter than those of *P. faginea*. Spores (?) oblong, hyaline, 4-guttulate, 22–25 × 8–10 μ" (Sacc.).

On bark of living branches of *Quercus Robur*. Common in England and Wales, but always barren; Epping; Hampstead; Lyndhurst; Hereford; Leicester; Warwickshire; Worcestershire; Gloucestershire; Cumberland; Cardigan; Co. Wicklow; etc.

Said to be the pycnidial stage of *Dichaena quercina* Fr. Resembling a brown-black Lichen, it forms round wrinkled patches 0·5–1·5 cm. wide on the bark. The specimens to be seen in herbaria, under this name, look exactly like the ascophorous stage.

Saccardo adds (Syll. iii. 680): "I suspect that the spores just described are nothing but the freed ascospores of the Dichaena. For I have never seen pedicellate spores, as I have in *P. faginea.*" Many others have had the same experience. Diedicke, however, asserts (*l.c.*) that he has observed "in the youngest pycnidia which have not yet become connate with each other" true pycnospores, which he describes as follows: "Oblong, varying in shape, hyaline, 4-guttulate and with three indistinct septa, 22–25 × 8–10 μ, on cylindrical sporophores, 10–15 × 2–3 μ, which soon disappear." He makes this the ground for his new genus, Psilosporina. But it will be seen that these spores are exactly like the ascospores of the Dichaena; and the problem is still undecided, for the supposed sporophores might have been germ-tubes, as has happened in many other cases.

Europe, N. America.

CYSTOTRICHA B. & Br. no. 448, in Ann. Nat. Hist. 1850, v. 457.

Pycnidia growing on wood, superficial or nearly so, horizontally elongated, opening by a longitudinal fissure. Sporophores branched, articulate, submoniliform, here and there beset laterally and terminally with oblong hyaline uniseptate spores.

This genus has hitherto been placed among the Hyalodidymae, but finds a better place among the Excipulaceae.

Alnus

Cystotricha striola B. & Br. in Ann. Nat. Hist. 1850, v. 457, pl. 12, f. 10. Cooke, Handb. p. 456, f. 168. Sacc. Syll. iii. 414; x. 317. All. vi. 710, with fig. *Pseudopatella Tulasnei* Sacc. Syll. iii. 688. Cf. Died. 409.

Pycnidia punctiform or linear, often arranged in short lines, black with a reddish tinge, disc reddish; texture thick and tough. Spores oblong, acrogenous and pleurogenous, continuous, at length 1-septate with the septum very delicate, hyaline, 7–8(–10) × 3 μ; sporophores long, cylindrical, once or twice branched above, articulate from the base, submoniliform, the joints about as long as broad.

On bare wood (? of *Alnus*). Batheaston, Somerset; King's Cliffe, Elton, Northamptonshire; Wiltshire. Nov.–Feb.

It looks almost like a *Tubercularia*, but has a pycnidium. In France it is recorded on fallen logs of *Alnus*, and is considered to be

the pycnidial stage of *Durella compressa* Tul. = *Peziza compressa* Pers. It opens in a hysteriiform manner; see Died. in Ann. Mycol. 1912, x. 142; v. Höhn. Fragm. Myk. no. 538; and Tul. Carp. iii. 177, pl. 20, f. 11. It should better be named *Cystotricha compressa* v. Höhn.

Fr. Tyrol.

DISCELLA B. & Br. in Ann. Nat. Hist. 1850, v. 376.

Pycnidia resembling those of Discula, often not perfectly formed, long covered by the epidermis which is at length torn in various ways. Spores fusoid or oblong, 1-septate, subhyaline or faintly coloured.

Coniferae

Discella strobilina Died. 752. *Sporonema strobilinum* Desm. in Ann. Sci. Nat. 1852, xviii. 368. Sacc. Syll. iii. 678; x. 435. All. vii. 411. Mig. 511. Grove, in Journ. Bot. 1918, pl. 550, f. 8. *Hendersonia strobilina* (under Dichaena) Cooke, Handb. 932. *Phoma strobilina* Sacc. in Mich. ii. 97. *Phoma conophila* Sacc. Syll. x. 163. *Hysterium conigenum* Pers. Obs. Myc. i. 30. *Phoma conigena* Karst. in Rev. Mycol. 1885, p. 106, *p.p.* (including var. *abieticola* Sacc. in Ann. Mycol. 1905, p. 233; Syll. xviii. 261). See Vol. I, p. 75.

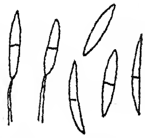

Fig. 70. *Discella strobilina*: spores, × 600.

Pycnidia subglobose or oblong, up to 500μ long, gregarious, sometimes confluent, convex, black, erumpent, surrounded by an erect frill of epidermis, fragile, dehiscing by narrow irregular fissures or into several unequal laciniae; disc convex, gelatinous, swelling with moisture and becoming opalescent-grey. Spores very numerous, fusoid, often slightly wider towards the upper end, but subacute at both ends, indistinctly guttulate, straight in face view, curved and narrower in profile, 10–18 × 2–3·5μ (9–16 × 3–4μ, Died.), at length distinctly (but somewhat rarely) 1-septate; sporophores linear, 20 × 2·5μ. (Fig. 70.)

On dry scales of cones of *Pinus* and *Picea*. Not uncommon: England, Wales, Scotland, Ireland. On leaf-scars of *Picea Pinsapo*, Hadzor, Ws. Winter, spring.

Cooke's record of this species on *Larix* seems to be a mistake: the scales in his specimen are those of *Picea*.

Saccardo, long ago, suspected that this species was ultimately 1-septate; indications foreshadowing this condition are not rare, such

as a lumpiness in the middle, or a faint "spurious" septum. But an actual unmistakable septum can be found by the persevering mycologist. The "guttules" do not look like oil-drops, but are more of the nature of a watery vacuole.

Sphaeria (*Hendersonia*) *strobilina* Curr., in Linn. Trans. xxii. 329, has exactly similar spores; but *Stagonospora strobilina* Sacc. Syll. iii. 450 (which is said to be = *Hendersonia strobilina* Curr.) may perhaps be different. See Cooke, Exs. no. 341. There is great reason to believe that this *Discella strobilina* is a modification of a Phomopsis and is genetically connected with a Diaporthe.

In the two varieties which follow, the septum has not yet been seen:

Var. **accedens** Sacc. in Mich. ii. 617; Syll. iii. 679. All. vii. 412. Grove, in Journ. Bot. 1918, p. 320, pl. 550, f. 8 *a*. *Phoma accedens* Sacc. in Mich. ii. 617. *P. strobiligena* Desm. *p.p.*

Spores cylindric-oblong, rather variable, rounded at both ends, 7–8 × 1·5–2 μ; sporophores simple, linear, longer than the spore. (Fig. 71.)

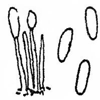

Fig. 71. *Sporonema accedens*: spores and sporophores, × 600.

On the apophysis of cone-scales of *Pinus silvestris*. Tanworth-in-Arden (Bayliss Elliott). Cofton Park, near Birmingham; South Devon; etc.

Mar.–Jun.

At first the pycnidium is closed and mouthless; it then opens and finally the upper part falls off, leaving the spore-mass as a black disc surrounded by the epidermis-frill. This disc swells up with moisture as in the type. In the Cofton Park specimens the spores reached 10 × 2·5 μ; Saccardo gives them as 8–11 × 2–2·5 μ.

Var. **microsporum** All. in Ber. Bayer. Bot. Ges. 1896, iv. 40; in Rab. Krypt. Flor. vii. 412. Sacc. Syll. xiv. 1001. Mig. 511. Cf. *Hymenopsis strobilina* (Lib.) Sacc. Syll. iv. 747, which seems to be the same fungus.

Pycnidia scattered or two or three together, erumpent, at length excipuliform, 150–200 μ diam., wrinkled, black. Spores oblong-ovoid, obtuse at both ends, very numerous, eguttulate, 5–8 × 2·5–3·5; sporophores not seen.

On scales of cones of *Pinus*. Sutton Park, near Birmingham; Dublin. Evidently merely a younger state of the species. Jan.

With moisture, the spore-mass swells up and looks black as if it were a globose superficial pycnidium, but on examination it will be

found to consist of spores only. In some exactly similar-looking pycnidia the spores measured only $4–5 \times 1–1{\cdot}5\,\mu$, but both sizes of spores could be found in the same pycnidium.

Vestergren's var. *ramulorum* = *Sclerophoma pithya* v. Höhn. See Vol. I, p. 156.
Europe, N. America.

Salix

Discella carbonacea B. & Br. in Ann. Nat. Hist. 1850, v. 377, pl. 12, f. 8 *d*. Cooke, Handb. 463. Sacc. Syll. iii. 687. All. vii. 433. Died. p. 753, p. 754, f. 1. Mig. 515. *Phacidium carbonaceum* Fr. Syst. Myc. ii. 574. *Stilbospora microsperma* Johnston, Flor. Berwick, ii. 192. *Septomyxa exulata* Sacc. Syll. iii. 767. *Septomyxa picea* Sacc. in Ann. Mycol. xi. 560. (Fig. 72.)

Fig. 72. *Discella carbonacea*: spores, × 600.

Pycnidia irregularly scattered, convex, at first covered, then erumpent by tearing the epidermis, at length black, 0·5–1 mm. wide, discoid or saucer-shaped; wall minutely parenchymatous, thinner above, brown. Spores fusoid, straight, nearly hyaline or faintly greenish, 1-septate, not constricted, rather widest at the septum, $13–18 \times 3{\cdot}5–5\,\mu$; sporophores cylindrical, from half as long to as long as the spore, dark-grey at the base, fasciculate.

On dead twigs of *Salix*, especially *S. alba*, *S. vitellina*, and *S. fragilis*. Very common: England, Scotland, Ireland.

Said to be the pycnidial stage of *Diaporthe salicella* Sacc. or of *Gnomonia salicella* Schröt., both of which are included by Wehmeyer under his *Cryptodiaporthe salicina*.

The pycnidium is, in general, complete above at first, but irregular in form; it then disappears by degrees from the centre to the margin as the epidermis breaks up, and at length leaves a saucer-shaped disc consisting only of the spore-mass, resting on the proliferous stratum and surrounded by the Phacidium-like segments of the epidermis. The spores are for a time continuous, then they have the protoplasm divided in the middle; only when they are quite mature does the septum show up, and even then it is often very delicate and easily overlooked. The spore-mass is sometimes pinkish.

Mr Boyd collected some specimens on the bare wood, which have a different habit owing to their growing between the wood-fibres, but the spores are the same. Rev. H. W. Lett, Dr J. W. Ellis, and I have found *D. carbonacea* growing on Willow twigs in close combination with *Diplodina Salicis* and passing gradually into it. Cf. Tul. Carp. ii. 181.

Diedicke records a form which is exactly similar, externally, to

D. carbonacea, on *Salix Caprea*, but having 2- and 3-septate spores. Dr Rhodes and I found this on *Salix fragilis* at Brecon in May, 1929.

Europe, N. America.

Sambucus

Discella abnormis B. & Br. in Ann. Nat. Hist. 1850, v. 378. Cooke, Handb. 464. Sacc. Syll. iii. 688. All. vii. 433.

Pycnidia small, spurious, globose, entirely covered by the epidermis and almost fused with the matrix, pierced above by a round pore. Spores shortly fusoid or lanceolate, yellow-brown.

On shoots of *Sambucus nigra*. Batheaston (Broome). *n.v.*

"Approaching the type of Diplodia" (B. & Br.). Certainly not a Discella. It may be a Microdiplodia. Cf. *Ascochytula plana* Died. 410.

TRICHOCREA March. in Champ. Copr. vi. 14. Sacc. Syll. x. 410.

Pycnidia superficial, ovoid, at first closed, then wide open and almost discoid, pale-coloured; texture parenchymatous, rather soft and waxy. Spores very numerous, narrow-cylindrical, 1-septate, hyaline; sporophores elongate-filiform, densely fasciculate, branched above.

The British species differs in having the pycnidium not parenchymatous, and the spores have not been seen to be septate, though they may become so.

Pinus

Trichocrea oödes Bayliss Elliott, in T.B.M.S. 1918, vi. 58, f. 12–16. Sacc. Syll. xxv. 493.

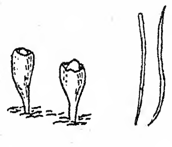

Fig. 73. *Trichocrea oödes*: two excipula, × 30, and spores, × 600 (after Elliott).

Pycnidia gregarious, superficial, of the shape of a lemon or an egg, 130–190 × 180–200 μ, shining, whitish, when old becoming blackish, at first closed, then open; pedicels 50–100 μ long; excipulum composed of very narrow septate interwoven hyphae, ciliated on the margin with converging hairs. Spores elongate, linear, rarely bent, sometimes thicker in the middle, pluriguttulate but eseptate, 30–60 × 0·5 μ; sporophores rising in dense fascicles from the base of the pycnidium. (Fig. 73.)

On a fallen cone of *Pinus silvestris*, Tanworth-in-Arden, Wk.

Resembling a cluster of insect's eggs.

SIROPATELLA v. Höhnel, in Ann. Mycol. 1903, i. 401. Sacc. Syll. xviii. 443.

Pycnidia globose, erumpent, then superficial, black, fleshy-coriaceous, at first closed, then dehiscing irregularly and becoming widely open. Sporophores densely crowded, simple, short. Spores acrogenous, singly hyaline, catenulate, 1-septate when mature.

Wood

Siropatella aurodisca, comb. nov. *Cystotricha aurodisca* Cooke, in Grevill. v. 56. Sacc. Syll. x. 317. All. vi. 710.

Pycnidia oval or elliptic, splitting longitudinally and becoming excipuliform, black; margin toothed; disc orange; wall of pycnidium of two layers, outer firm and brown, inner yellowish and soft. Spores cylindrical, golden-yellow in mass, truncate at the ends, acrogenous in very long chains, 12–16 × 1·25–1·5μ; sporophores short, filiform, cylindrical, crowded, parallel.

On chips of wood. Darenth (Cooke).

The spores were not seen to be septate in the original specimen. Cooke described the sporophores as branched above, but this was not seen in the specimens examined.

"When moist it looks like a large Phacidium, with a black dentate margin and a concave orange disc. In that condition it is rather gelatinous; probably an incomplete condition of some discomycetous fungus" (Cooke).

S. rhodophaea v. Höhn. (*l.c.*), which is exactly similar to *S. aurodisca* in general character, was found in Bohemia on dry wood of *Fagus*. Its 1-septate spores are rosy in colour and have rounded ends; they measure 9–12 × 2–3 μ. The absence of the peculiar truncate "osteiform" ends and the septum at once distinguish them from those of *S. aurodisca*, but the two species are evidently closely allied to each other and not to Cystotricha.

PSEUDODIPLODIA Karst. Symb. Myc. Fenn. xv. 156. Sacc. Syll. iii. 621.

Pycnidia more or less superficial, globose, waxy-fleshy, when moist fuliginous, soon opening with a wide mouth. Spores ellipsoid, 1-septate, pale olivaceous.

Karsten's type of this genus was found on old wood near Helsingfors.

Acer

Pseudodiplodia corticis Grove, in Journ. Bot. 1886, p. 197, pl. 266, f. 6. Sacc. Syll. x. 409. All. vii. 309. Died. 696. Mig. 475.

Pycnidia widely effused, gregarious or collected into short lines or spots, globose or oblong, erumpent, then nearly superficial, when dry brownish-black, smooth, shining, 1–1·4 mm. diam., pierced by a small pore; wall soft, waxy, olivaceous, subferruginous, minutely parenchymatous. Spores oblong, subfusoid, obtuse at both ends or pointed at one end, rarely somewhat curved, for a long time continuous, but finally thinly 1-septate, scarcely constricted, seldom guttulate, singly hyaline, but in mass pale-olive, 10–14 × 3–4 μ; sporophores somewhat branched, fasciculate, twice or thrice as long as the spore. (Fig. 74.)

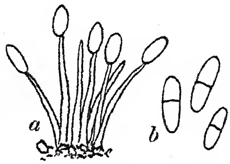

Fig. 74. *Pseudodiplodia corticis*: *a*, spores (young) on the sporophores, × 500; *b*, mature spores, × 600.

On inside of bark of *Acer Pseudoplatanus*. Sutton Coldfield. Dec.–Feb.

Occasionally found on the wood, like *P. ligniaria* Karst. (Sacc. Syll. iii. 621), but differing from that in the spores which are only about half as wide, and especially in the very much larger pycnidia (5–7 times as broad). The pore rapidly widens, and becomes torn after the style of a Phacidium or a Hysterium; soon the upper part of the pycnidium vanishes altogether and exposes a disc. This genus was at first, erroneously, classed among the Nectrioideae.

Germ.

Perhaps the spores, from Lucknam, Wiltshire, figured by Berkeley in "Outlines", pl. 1, f. 10, as Diplodia, and assigned by him as a pycnidial stage to his *Tympanis saligna* (= *T. Ligustri* Tul.; see Outl. p. 374) belong really to Pseudodiplodia. But they do not seem to have been met with again.

EXCIPULINA Sacc. Syll. iii. 688.

Pycnidia excipuliform or ± cup-shaped, erumpent, becoming superficial, black, glabrous. Spores elongate-fusoid, with two or more septa, subhyaline.

Wood

Excipulina ramicola Grove, in Journ. Bot. 1916, p. 219. *Excipula ramicola* Cooke & Mass. in Grevill. xvi. 9. Sacc. Syll. x. 432. All. vii. 399.

Pycnidia superficial, scattered or gregarious, discoid, convex, then excipuliform, black, about 250μ diam., subglobose at first, soon becoming torn at the summit; texture loosely parenchymatous, dark-olive. Spores cylindric-clavate or subfusoid, straight or curvulous, obtuse at apex, multiguttulate, at length multiseptate (septa 3–7), 25–35 × 3·5–4μ; sporophores short, simple. (Fig. 75.)

On decorticated branches of *Acer obtusatum*, Kew Gardens (Cooke & Massee). On decorticated branches of *Ilex Aquifolium*, Sheldon Hall, Warwickshire. Apr.

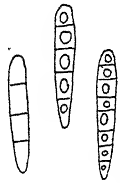

Fig. 75. *Excipulina ramicola*: spores, on *Ilex*, × 600.

The size of the spores is correctly given by Cooke and Massee, but even in their specimens the spores are septate, each loculus frequently containing a large guttule. Cf. *Patellaria vermifera* Phill. Discom. 369.

TOPOSPORA Fr. Fung. Natal. 33.

Pycnidia seated on a floccose subiculum under the bark, gregarious, varying in form, thick-walled, waxy, brown; texture of parallel prosenchyma, becoming parenchymatous upwards. Spores elongate, fusoid, hyaline, 3-septate; sporophores filiform.

The pycnidial stage of species of Scleroderris. It seems probable that this genus belongs to the Excipulaceae and should stand next to Excipulina, rather than where Saccardo and Diedicke place it, in Sphaerioideae and Nectrioideae respectively, and that it is ± identical with Pilidium.

Salix

Topospora proboscidea Fr. *l.c.* *Mastomyces proboscidea* Sacc. Syll. iii. 456. All. vi. 992. Died. p. 702, p. 690, f. 10. Cf. Tul. Carp. iii. 166, pl. 20, f. 3; Phill. Discom. 348; and Bubák, in Ann. Mycol. iv. 118.

Pycnidia erumpent in clusters, variable, ± compressed, up to 1 mm. wide and 600μ high, seated on a subcortical fuscous subiculum; wall thick, waxy, brownish, externally villose with short brown hairs, afterwards nearly glabrous

and shining black. Spores fusoid, straight or curvulous, acute at both ends, continuous, hyaline, then 3-septate, 20–30 × 2–3 μ; sporophores crowded, filiform, short or sometimes as long as the spore, 1·5–2 μ broad. (Fig. 76.)

On dry branches of *Salix* (*Caprea*). Rockingham Forest (Berk.).

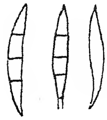

Fig. 76. *Topospora proboscidea*: spores and sporophores, × 600.

The pycnidial stage of *Scleroderris fuliginosa* Karst. = *Cenangium fuliginosum* Fr., with which it occurs. *Topospora uberiformis* Fr. = *Mastomyces Friesii* Mont. is said to stand in the same relation to *Scler. ribesia* Karst., but is not known as British (spores 16–20 × 2·5 μ).

EXCIPULARIA Sacc. Syll. iii. 689.

Pycnidia excipuliform, black, setose. Spores fusoid, with two or more septa, brownish-hyaline; sporophores short.

Clematis

Excipularia fusispora Sacc. Syll. iii. 689. All. vii. 438. *Excipula fusispora* B. & Br. in Ann. Nat. Hist. 1859, iii. 359, pl. 9, f. 1. Cooke, Handb. 458.

Pycnidia minute, very black, densely invested with rigid bristles. Spores narrowly fusiform, brownish-hyaline, curved, 6–8-septate, 40–50 × 3–4 μ; sporophores short, linear.

On bark of *Clematis Vitalba* (chiefly on the inside). Batheaston and Warleigh, Somerset. *n.v.* Oct.–May.

"Forming very minute black specks; pycnidia clothed with dense slightly waved continuous setae; spores curved, fusiform, multiseptate, the two extreme articulations hyaline, the others rather darker" [i.e. faintly brownish] "and generally containing a globose guttule" (B. & Br.). Von Höhnel says that this species belongs to the Tubercularieae, and has no pycnidium (Fragm. 1904, no. 60).

Austr. Swed.

PILIDIUM Kunze, Myk. Heft. ii. 92, emend. Sacc. Syll. iii. 689.

Pycnidia discoid or shield-shaped, irregular in form, erumpent, membranaceous, dusky-black, at length somewhat laciniate around the margin, with a paler disc. Spores oblong or fusoid-falcate, hyaline, with two or more septa.

Salix

Pilidium fuliginosum Auersw. in Hedwig. 1866, p. 191. Sacc. Syll. iii. 689. All. vii. 437. Died. p. 756, p. 754, f. 5. Mig. 517. *Cenangium fuliginosum* Fr. El. Fung. ii. 23, *p.p.* *P. carbonaceum* B. & Br. in Ann. Nat. Hist. 1850, v. 456. Cooke, Handb. 440.

Pycnidia irregular, dingy blackish-brown, flatly pulvinate, up to 250μ diam., opening by a pore, crowded into broad patches, and often immersed in a widely effused subiculum, which sometimes tends more or less to surround the branch, but is here and there totally wanting. Spores falcate-fusoid, 2–3-septate, 18–28 × 3–4μ (20–25 × 2–2·5μ, Died.); sporophores very short. (Fig. 77.)

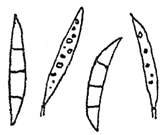

Fig. 77. *Pilidium fuliginosum*: spores, × 600.

On branches of *Salix*. King's Cliffe; Twycross (Berk.). Lanark and Ayrshire (Boyd).

Diedicke could find no trace of a subiculum in his specimens. It is usually said to be the pycnidial stage of *Scleroderris fuliginosa* Karst. But Rostrup asserted (Bot. Tids. xxii. 264) that it belonged to *Cryptomyces maximus* Rehm = *Rhytisma maximum* Fr., a pest of Willow which is sometimes followed by the Scleroderris, and on and around which the Scleroderris grows. Cf. Topospora, p. 152.

Fr. Ardennes, Holl. Germ. Denm.

ONCOSPORA Kalch. in Grevill. 1880, ix. 19.

Pycnidia erumpent, cupuliform or discoid, generally gregarious or caespitose on a stroma like that of Tympanis; hymenium naked and gelatinous. Spores hyaline, continuous, flexuose, borne at the apex of very delicate hyphae.

The pycnidia are at times somewhat pedicellate. The genus (with two species) was first described by Kalchbrenner from South Africa; one of these (on *Lapparis*) has spores very similar to those of the following species.

Coniferae

Oncospora Pinastri Died. 760. *Cenangium Pinastri* Moug. Stirp. Vog. *apud* Fr. Syst. Myc. ii. 184. *Micropera Pinastri* Sacc. in Mich. ii. 104. *Dothichiza Pinastri* Lib. *apud* Roum. in Rev. Mycol. 1880, p. 17. ? *Oncospora abietina* Oud. & Fautr. in Bull. Soc. Myc. Fr. 1899, p. 155.

Pycnidia caespitose, erumpent, subglobose-conical, but distorted by mutual pressure, black, shining, rather hard, at

length opening in the form of a cup. Spores fusoid-falcate, more acute at the base than at the apex, curved or flexuose, granular or pluriguttulate, hyaline, 30–35 × 4–5μ, 50–60 × 5–7μ (Sacc.), 30–50 × 3·5–5·5μ (Died.); sporophores linear, curvulous, crowded, erect, parallel, colourless, a little shorter than the spore, rising from a soft yellowish-olivaceous stratum; margin of the cup brown, of distinct squarish parenchymatous cells. (Fig. 78.)

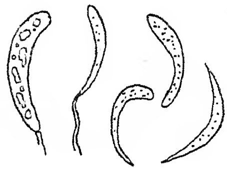

Fig. 78. *Oncospora Pinastri*: spores, two on their pedicels, × 600.

On old leaf-scars of *Picea Pinsapo*. Hadzor Hall, Droitwich. Mar.

In Germany it is found on the bark of other Conifers, *Abies*, *Pinus*, etc. The spores often assume the shape of an Australian boomerang, but are very variable in their curvature, and at times a spore and its pedicel present a great resemblance to a bill-hook. It is said to be a pycnidial stage of *Cenangium Abietis*, but the same is said of *Dothichiza ferruginosa* Sacc., *q.v. supra*, p. 142. At Hadzor it was accompanied by *Camarosporium Abietis* Wils. & And. (*q.v.*).

Fr. Germ. Ital.

HETEROPATELLA Fckl. Symb. Myc. Nachtr. II. 54.

Pycnidia subepidermal, then sessile on the decorticated stem, coriaceous, swollen, subglobose, umbilicate; mouth at first contracted, then open and often laciniate; disc concave, fleshy. Spores elongate-fusoid, ± lunate, acute at both ends, hyaline, guttulate, ultimately septate, prolonged upwards into a subulate beak; sporophores filiform, sometimes branched.

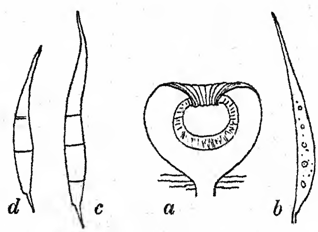

Fig. 79. *Heteropatella*: *a*, diagrammatic section of excipulum of *H. Bonordenii*, × 50; *b*, spore of the same; *c*, spore of *H. valtellinensis*; *d*, of *H. Antirrhini*; all spores × 600. The spore *b* is immature.

The species assigned to this genus form the pycnidial stage of Discomycetes belonging to Heterosphaeria. In many cases the stylospores and the asci with ascospores are to be seen growing side by side on the same hymenium. All the described species of the group seem to be much alike, and to be distinguished

(if at all) only in the ascophorous stage. It is maintained by some that each is strictly confined to one kind of host, but there has been great confusion in the use of the names.

Antirrhinum

Heteropatella Antirrhini Budd. & Wakef. in T.B.M.S. 1926, xi. 169–186, with figs. and suppl. note, *ibid.* p. 188; also 1929, xiv. 220.

Pycnidia covered, then superficial and seated on the wood after the cortex has fallen off, scattered, 500–600μ diam., brownish, then black, globose-depressed, at first closed, then dehiscing by irregular laciniae; peridium coriaceous, whitish within, of thick-walled densely interwoven hyphae. Disc plane, fleshy, pallid; sporophores vertically densely crowded, filiform, branched. Spores falcate, attenuated at each end, hyaline, at length 2- or 3-septate, 25–30 (or even 35) × 3–4μ, extruded in pallid-rosy globules, having at the apex a filiform appendage 20–25μ long and at the base a shorter one like a pedicel. (Fig. 79*d.*)

On dead stems of *Antirrhinum majus* (cult.). South of England and Midlands: Reading; Wisley; Kent; Cornwall; etc.

It was preceded by *Pseudodiscosia Antirrhini* Budd. & Wakef. (formerly *Cercosporella* Wakefield) *q.v. infra*, p. 286, and was found to occur on dead decorticated stems of diseased plants which had survived the winter in a damp situation.

Dianthus

Heteropatella valtellinensis Wollenw. in Zeitschr. f. Parasitenk. 1931, iii. 499. *Excipulina valtellinensis* Trav. in Ann. Mycol. 1903, i. 316. Sacc. Syll. xviii. 443. *Heteropatella Dianthi* Budd. & Wakef. in T.B.M.S. xiv. 220, with figs.

Pycnidia scattered, epiphyllous, erumpent, globose-depressed, soft, brown, 250–300μ diam., at length dehiscing irregularly and disclosing a pallid disc. Spores fusoid, ± falcate, hyaline, mostly 2–3-septate, not constricted, 20–25 × 4–6μ, attenuated toward both ends, furnished with a filiform appendage 12–20(–30)μ long above and a shorter one (and as it were pedicellate) below; sporophores crowded, erect, filiform, branched, 30–40 × 3–5μ. (Fig. 79*c.*)

On dead or dying leaves of *Dianthus Caryophyllus*. Kent, etc. in the southern counties of England, from 1927.

Apr.–Jun.

It was accompanied by *Pseudodiscosia Dianthi* Höst. & Laub. (*q.v. infra*, p. 287). The young spores were often devoid of appendages.
Holl. Germ.

Linaria

Heteropatella lacera Fckl. Symb. Myc. Nachtr. II. 54, f. 21. Sacc. Syll. iii. 670. All. vii. 403, with fig. Died. 759. Mig. 518. Lind, Dan. Fung. 474. *Pestalozzia phacidioides* Ces. in Klotzsch, Herb. Myc. II, no. 65. Sacc. Syll. iii. 801. *Peziza Linariae* Raben. Herb. Myc. I, no. 724. See T.B.M.S. 1926, pp. 186–8, and Wollenweb. in Zeitschr. f. Parasitenk. 1931, iii. 508.

Pycnidia 500–900μ diam., black, similar to those of *H. Bonordenii*. Spores fusoid, lunately curved, multiguttulate, 26–30 × 4μ, with a long filiform apical prolongation; sporophores densely fasciculate and branched.

On dead stems of *Linaria vulgaris*, near Odiham, Hampshire (A. E. Thomas). Spring.

The pycnidial stage of *Heterosphaeria Linariae* (Raben.) Rehm, in Krypt. Flor. iii. 204. See Winter, in Hedwig. xiii. 130; Mig. Ascom. ii. 841.

Recorded in Spain on *Linaria nivea*, but also on *Brassica*, *Cheiranthus*, *Lactuca*, and *Dipsacus*. See Fragoso, Flora Guadarrama (1914) for fig.

I have examined Fuckel's exsiccatum, no. 2565, on *Linaria* ("*Heteropatella lacera*"), and find the spores to be acutely fusoid, somewhat curved, colourless, microguttulate within, 20–30 × 1·5–3μ, with a short almost filiform prolongation at the base, and at the apex a much longer one which is capilliform, curving to one side, and reaching as long as 30μ.

Belg. Germ. Austr. Denm. Ital. Spain.

Umbelliferae

Heteropatella Bonordenii Lind, Dan. Fung. 473. *Excipula Bonordenii* Hazsl. in Oesterr. Bot. Zeit. 1883, xxxiii. 250. *Heterosphaeria patella* Bon. Abhandl. pl. 2, f. 10 *a*, *b* (*non* Grev.). *Excipulina patella* v. Höhn. Mig. 516. *H. lacera* Auct. *p.p.max.*

Pycnidia covered, then superficial as the epidermis vanishes, scattered or ± gregarious, subglobose, 300–500μ diam., shining, striate, blackish-brown, umbilicate, at length laciniate and open, afterwards (when dry) closed; disc dingy-grey. Spores abundant, fusoid, lunately curved, pluriguttulate, at length 2- or 3-septate, perfectly hyaline, about 20–28 × 3·5–4·5μ, with an acutely-pointed apical prolongation 10–15μ or more long which is somewhat obliquely

placed; sporophores filiform, erect, crowded, 10–20(–40) × 1–1·5μ, often branched. (Fig. 79 *a*, *b*.)

On dry dead stems of Umbelliferae—*Angelica*, *Foeniculum*, *Heracleum*, and especially of wild *Daucus Carota*. Not uncommon: England, Wales, Ireland.

A very interesting species. It is the pycnidial stage of *Heterosphaeria patella* Grev. Scot. Cr. Flor. pl. 103. The young asci and spores can often be seen side by side with the pycnospores. Cf. Tul. Carp. iii. 175, pl. 18, f. 17–19; Brefeld, Untersuch. 1891, x. 282, with fig.; Phill. Discom. p. 371, pl. 11, f. 71; Lind, Dan. Fung. 138; Wollenweber, Fus. mon. del. 1931, p. 509; Nannfeldt, Studien, 1932, p. 296.

The description given above is taken from some excellent specimens found on Fennel at Polperro by Mr Rilstone, where the asci and stylospores were intimately intermixed. The descriptions given by different authors vary considerably, especially as to the length of the sporophores which are often much elongated when growing with the asci. The frequent use of the word *seta* or appendage for the apical prolongation is misleading. Abroad the fungus has been recorded on *Anthriscus*, *Apium*, *Carum*, *Ligusticum*, *Pastinaca*, *Petroselinum*, *Pimpinella*, etc.

N. and W. Europe.

DOUBTFUL SPECIES

Gentiana, etc.

[**Heteropatella umbilicata** Jaap, in Fung. sel. exs. no. 196; and in Ann. Mycol. 1907, v. 266. Died. p. 759, p. 754, f. 9. *Peziza umbilicata* Pers. Myc. Eur. i. 323. *H. lacera*, f. *umbilicata* Sacc. in Mich. ii. 116; Syll. iii. 671. All. vii. 104. Mig. 518. *Hymenopsis umbilicata* Sacc. Syll. iv. 746. *Hymenula umbilicata* Fr. Elench. ii. 37. Cf. also *Kellermania alpina* Ell. & Ev. in Bull. Torr. Bot. Club, 1900, p. 57. Sacc. Syll. xvi. 950.

Differing from *H. Bonordenii* in having slightly narrower spores (about 25 × 2–3μ); sporophores 10–15 × 3μ, simple or branched, bearing the spores apically and laterally.

This seems to be an alpine species, reaching to 2430 metres above sea-level; it is recorded abroad on *Gentiana*, *Campanula*, etc. Persoon's *Peziza umbilicata* was on *Gentiana*. The records for Britain (Norbury Park, etc.) are untrustworthy. Jaap says, in Ann. Mycol. v. 266, that the spores become ultimately 1-septate.]

Forma **minor** Sacc. & Trav. in Ann. Mycol. 1914, xii. 285; Syll. xxv. 526.

Pycnidia 250–300μ diam. Spores 25–30 × 3·5–4μ (without

the appendages, of which, however, there was little or none).

On the involucre of *Carlina*, in Spain.

Fr. Germ. Switz. Denm. Spain, U.S.A.

For the sake of completeness, there will now be given particulars of two forms, evidently similar, on *Rumex* and *Polygonum* respectively, which are likely to be found here; they have been overloaded with names, such as:

Heteropatella cercosperma Lind, Dan. Fung. p. 473, pl. 9, f. 119. *Septoria cercosperma* Rostr. Fung. Groenl. p. 571. *Kellermania cercosperma* Lind, in Meddel. om Groenl. xliii. 159. *Rhabdospora cercosperma* Sacc. Syll. x. 391. *R. caudata* Sacc. Syll. iii. 593. *Septoria caudata* Karst. in Hedwig. 1884, p. 38. *Kellermania Rumicis* Fautr. & Laub. and *K. Polygoni* Ell. & Ev. *qq.v. infra.*

The two species referred to are:

Rumex

Kellermania Rumicis Fautr. & Laub. in Rev. Mycol. 1897, p. 141. Sacc. Syll. xiv. 964. All. vi. 992.

Pycnidia erumpent, membranaceous, thick, black, depressed, mouthless. Spores very numerous, obclavate, hyaline, simple, 15–16 × 3μ, produced upwards into a long thin seta 18μ long, at length (according to Rostrup's figure in Lind, Dan. Fung. pl. 9, f. 119) 1–3-septate.

On stems of *Rumex crispus* in France.

Polygonum

Kellermania Polygoni Ell. & Ev. in Journ. Mycol. 1886, p. 111. Sacc. Syll. x. 337.

Pycnidia erumpent, membranaceous, loosely parenchymatous in texture, black, globose-depressed, up to 500μ diam., ostiole papilliform, pierced. Spores lanceolate, 1-septate, 30–40 × 3–4μ (including the appendages), rounded below, yellowish-hyaline, at first granular, then guttulate, contracted gradually from above the middle into a long straight subulate slender beak.

On stems of *Polygonum* in California.

These two forms have not yet been found in Britain, but they are closely allied to our *Amphorula sachalinensis* (see Vol. I, pp. 362–3).

Rostrup's plant was found on *Rumex*, but Nannfeldt is of opinion that *H. cercosperma* differs from the other species of the genus in

being plurivorous and occurring on hosts of diverse families. But? No perfect stage is on record for it except *Heterosphaeria patella*, var. *alpestris* v. Höhn., suggested by Lind, and a statement by Nannfeldt (Studien, p. 296, note) that he has found that stage once on *Saussurea alpina*.

Still other fungi assignable to Heteropatella are recorded abroad on *Cacalia* and other Composites, *Clematis*, *Poa*, *Salix*, *Trollius*, *Valeriana* (*Excipulina conglutinata* Ell. & Ev.; see Sacc. Syll. iii. 689), and *Veronica*. Obviously a fresh study is necessary *ab initio*, before the existing chaos can be relieved.

LEPTOSTROMATACEAE

Pycnidia ± distinctly dimidiate or shield-shaped, either mouthless or opening by an ostiole or by a longitudinal fissure, membranaceous or carbonaceous, black, when mature almost always covered merely by the cuticle (i.e. growing in the epidermal cells and destroying them), erumpent, at length ± superficial; often occupying discoloured "spots".

The chief mark of this family lies in its halved peridium, there being in general a true pycnidial wall only above, and below a thick or thin proliferous stratum (which, however,

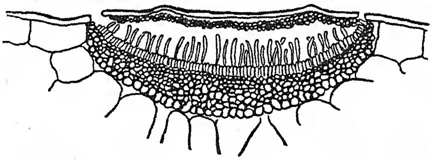

Fig. 80. *Leptothyrium subtectum*: vertical section of the pycnidium (taken from Berkeley's specimen labelled "*Cryptomela Caricis*"), × 144.

may be in some cases *inverted*). Many species of Phomopsis, when young, are constructed in a manner very similar to some of these, but they always lie below the epidermis and not below the cuticle alone.

Many of this group are known to be pycnidial stages of species of Phacidiaceae or of Hysteriaceae, but they are not confined to those.

Diedicke (Ann. Myc. 1913, xi. 177) divides the family into six groups:

A. Pycnidia thin above and below, radiately built, sporophores indistinct.

B. Pycnidia thin above, with a basal layer from which rise filiform sporophores.

C. Pycnidia thin above, below with a thick layer of pale-brown ± cubical cells, on which lies a hyaline layer of mucous swollen sporophores. (Fig. 80.)

D. Pycnidia thick-walled above and below, and of several layers.

E. Upper wall of one layer of elongated vermiform cells which grow from the periphery towards the centre and break open in the reverse direction; lower layer Melanconium-like.

F. Sclerotial forms, with very thick-walled cells.

The group F is usually nothing but the early state of the ascophorous form with which the Leptostromatacea may be genetically connected; e.g. *Leptostroma Juncacearum.*

The following species are arranged in the alphabetical order of their hosts, Dicotyledons first (the plurivorous species at their head), followed by the Monocotyledons, the Cryptogams, etc.

Pycnidium dimidiate or shield-shaped.

Leptothyrieae

Sporophores erect, standing on the lower pycnidial wall.

I. Spores continuous, hyaline.
 A. Pycnidia without any stroma.
  1. Pycnidia opening by a pore or slit, but not by a long fissure
   a. Pycnidia shield-shaped, easily seceding.
    † Spores single, not in chains . . . *Leptothyrium*
    †† Spores in chains . . . . *Schizothyrella*
   b. Pycnidia irregular or star-shaped . . . . *Piggotia*
  2. Pycnidia hysterioid, opening by a long fissure.
   a. Pycnidia lanceolate or elongate . . . *Leptostroma*
   b. Pycnidia circular, two-lipped . . . . . *Labrella*
 B. Pycnidia immersed in a stroma.
  1. Pycnidia opening by long flexuous fissures . *Melasmia*
  2. Pycnidia opening by a short irregular slit *Apomelasmia*

II. Spores oblong or fusoid, transversely septate . . . *Discosia*

III. Spores arranged in a cruciform shape . . . *Entomosporium*

IV. Spores muriform . . . . *Dictyothyrium*

V. Spores filiform, septate or not . . . . . . *Leptostromella*

VI. Spores small, continuous, coloured . . . . . *Pirostoma*

Pycnothyrieae

Sporophores inverted, seated on the under side of the upper pycnidial wall.

I. Spores continuous, hyaline, rather short.
 A. Pycnidia opening radially from the centre . *Pycnothyrium*
 B. Pycnidia opening by a slit or fissure . . . *Thyriostroma*

II. Spores elongated, filiform . . . . *Actinothyrium*

Leptothyrieae.

Sporophores standing erect on the lower pycnidial wall.

LEPTOTHYRIUM K. & S. Myk. Heft. ii. 79, emend. Sacc.

Pycnidia dimidiate, shield-shaped, membranaceous or carbonaceous, black, mouthless or opening by a pore or in various ways (but not by a longitudinal fissure), then becoming free round the margin, generally of a distinct parenchymatous texture but sometimes appearing to consist above only of the blackened cuticle or epidermis. Spores ovoid-oblong or fusoid, one-celled, hyaline.

Plurivorous

Leptothyrium vulgare Sacc. in Mich. ii. 113; Syll. iii. 633. All. vii. 324. Died. 707. Mig. 482. *Leptostroma vulgare* Fr. Syst. Myc. ii. 599. *Leptothyrium Scorodoniae* Sacc. Syll. iii. 634.

Pycnidia gregarious, nearly circular, flat, shining, black, 300–400μ diam., easily separating; texture parenchymatous, indistinctly radiating. Spores sausage-shaped, curvulous, rather obtuse at the ends, 5–8 × 1–2μ; sporophores short.

On dead herbaceous stems, *Galium*, *Scrophularia*, etc. Common and very variable in size. Colney Hatch; Southgate (Cooke). On dead stems of *Epilobium angustifolium*, Cofton Park, Ws.; Aberdeen. On dead stems of *Artemisia*, Berwick (Johnston); Aberdeen (Trail); Ayrshire (Boyd). On *Heracleum*, Thringstone. On *Leycesteria*, Ayrshire (Boyd). On dead stems of *Serratula tinctoria*, S. Devon (Rhodes). On *Teucrium Scorodonia*, Dublin (O'Connor).

The pycnidium of *Hypoderma commune* Duby, which frequently accompanied it. Recorded abroad on many other similar plants, but perhaps a composite species.

Europe, Siberia, N. America.

Leptothyrium macrothecium Fckl. Symb. Myc. p. 383, pl. 2, f. 28. Sacc. Syll. iii. 633; Fung. Ital. pl. 1489. All. vii. 338, with fig. Died. 713. Mig. p. 488, pl. 63, f. 10–13. Grove, in Journ. Bot. 1922, p. 85. Shear & Dodge, in Mycologia, 1921, pp. 135–170.

Pycnidia hypophyllous or on the stems, scattered, oblong

or hemispherical, convex, dull (not shining), 0·5–1 or even 2 mm. long, mouthless, brownish-black; wall of small brown parenchymatous cells above, thicker below. Spores fusoid, curved, acute at the lower or at both ends, 6–8·5 × 1·5μ; sporophores fasciculate, linear-filiform, forked or branched, colourless, 15–20 × 0·75μ, rising from the thick lower stratum.

On small dead branches of *Rubus fruticosus*, West Kilbride, Ayrshire (Boyd). On dead and fragile leaves of *Cornus alba*, Kilwinning, Ayrshire (Boyd). Recorded in Europe also on leaves of *Potentilla*, *Quercus*, *Rosa*, etc.

In Mycologia (*l.c.*) Shear & Dodge assign over 50 species of plants (leaves and fruits) as hosts of this species (including *Fragaria*, *Oenothera*, *Potentilla*, *Pelargonium*, *Rosa*, *Rubus*, etc.). They combine:

Hainesia Lythri (Desm.) v. Höhn.	(as conidial stage)
Ceuthospora concava Desm.	
Leptothyrium protuberans Sacc.	
Sporonema dubium Massal.	
Ceuthospora Rubi Petr.	(as pycnidial stage)
Sclerotiopsis Potentillae Oud.	
S. Pelargonii Scalia	
S. Rubi Massal.	
Peziza Oenotherae C. & Ellis	(as ascophorous stage)

all as parts of the same fungus-cycle, their *Pezizella Lythri* which = *Discohainesia Oenotherae* Nannf. (Studien, p. 88). A thoroughly optimistic view!

Europe, U.S.A.

Leptothyrium protuberans Sacc. in Mich. ii. 351, 380, 574; Syll. iii. 635. All. vii. 333.

Pycnidia scattered, oblong, very convex, 0·5–1 mm. long, black, polished, shining, at length sunken in the middle, formed chiefly of the altered epidermis. Spores numerous, fusoid, curved, acute at both ends, 7–10 × 1·5–2μ; sporophores filiform, simple or forked, 20–25 × 1μ. (Fig. 81 *c*, *d*.)

On stems of *Rubus*, West Kirby, Cheshire (Ellis). On dead stems of *Epilobium angustifolium*, Ayrshire (Boyd); Selly Oak, near Birmingham. On *Megasea crassifolia*, Norfolk (E. A. Ellis). Mar. Apr.

Closely allied to *L. macrothecium* Fckl. (*q.v.*) and possibly identical with it.

Europe, U.S.A.

Leptothyrium quercinum Sacc. in Mich. ii. 113; Syll. iii. 628. All. vii. 340. Died. 713. Mig. 489. *Leptostroma quercinum* Lasch, in Klotzsch, Herb. Myc. no. 1075. *Leptothyrium Castaneae* var. *Quercus* Massal. in Bull. Soc. Bot. Ital. 1900, p. 255.

Spots round, pale. Pycnidia usually epiphyllous, roundish or angular, dimidiate, flat, black, shining, 150–200μ diam.; texture indistinct, radiating. Spores ± linear, 3–5 × 0·5–1μ, ("between rod-shaped and boat-shaped, 9 × 1·5μ," Sacc.).

On fallen leaves of *Quercus*. Darenth; Oxford; Sussex; Warwickshire; Hereford; Cheshire; Keswick; Barmouth; Rhayader; Maentwrog; Ayrshire; Perthshire. Mar. Apr.

It is the pycnidial stage of *Coccomyces dentatus* Sacc., in company with which it grows. No spores could be found in any of the older specimens, but in those from Cheshire and Wales they measured as stated above; the spores seem to abound most in the spring. There is no doubt that *L. Castaneae* Sacc. (*infra*) is a variety of this.

Europe, U.S.A.

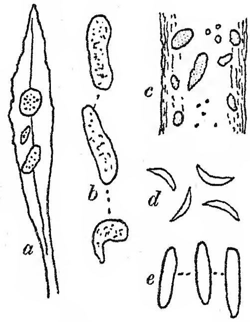

Fig. 81. *Leptothyrium*: *a*, leaf of *Aster Tripolium*, showing three "spots" caused by *L. asterinum* covered with pycnidia; *b*, spores of the same, × 600; *c*, stem of *Epilobium angustifolium* bearing pycnidia of *L. protuberans*, × 1·5; *d*, spores of *L. protuberans*, × 600; *e*, spores of *L. botryoides*, × 600.

Leptothyrium Castaneae Sacc. in Mich. ii. 631; Syll. iii. 628; xvi. 988. All. vii. 328. Died. 709. Mig. 485. *Leptostroma Castaneae* Spreng. Syst. Veg. 1827, iv. part 1, p. 538. Cf. *Leptothyrium Betulae* Fckl. Symb. Myc. 383.

Spots roundish, pale, often well-marked, 3–6 mm. across. Pycnidia amphigenous, angular or nearly circular, 180–200μ wide, flat, black, shining. Spores cylindrical, often curved, 4–6 × 0·5–0·7μ; sporophores crowded, filiform, occasionally forked, 10–12 × 0·5–1μ, sometimes longer.

On dead fallen leaves of *Castanea vesca*. Not uncommon: England; Wales. Spring.

The pycnidial stage of *Coccomyces dentatus* var. *Castaneae* Sacc., which often accompanies it.

Cf. *L. quercinum*. The spores are often smaller (2–4μ). The spots are frequently larger and more conspicuous on *Castanea* than on *Quercus*.

Fr. Germ. Austr. Ital. Port.

Leptothyrium medium Cooke, in Grevill. 1885, xiii. 98. Sacc. Syll. x. 412. All. vii. 341. Mig. 485. *Fusicoccum coronatum* Karst. in Hedwig. 1884, p. 21, *p.p.*

"Spots none. Pycnidia chiefly hypophyllous, scattered, up to 500μ diam., circular, depressed, dark-brown or blackish, at length rugose. Spores crescent-shaped, narrow, usually attenuated at each end, 12–15 × 2–2·25μ" (Cooke).

On dead leaves of *Quercus Robur*, *Q. Cerris*. Darenth; Gomshall (Cooke). Cheshire (Ellis). Baslow, Derbyshire, and Over Whitacre, Wk., etc. On *Betula*, Ayrshire (Boyd); Baslow (Bayliss Elliott). On *Fagus*, Norfolk (Plowright).

Mar.

It has been suggested that it is the pycnidial stage of *Coccomyces coronatus* Sacc., but Nannfeldt holds that *Leptothyrium botryoides* Sacc. (*q.v.*), which is the same as *Fusicoccum coronatum* Karst., is entitled to that position; probably all the three are forms of the same species.

In the Cheshire specimens the pycnidia are amphigenous, distinctly superficial, like a round flat biscuit, with a raised and thickened margin when old, opening by a central umbonate pore which afterwards becomes torn and wider; otherwise the same.

What is considered to be the same species is found also on *Castanea vesca*, and has been called:

Var. **castaneicola** Cooke, in Grevill. xiii. 98. Died. 709.

Pycnidia not more than half as wide as on Oak-leaves. Spores 12–14 × 1·5–2μ; sporophores of about the same length.

On leaves of *Castanea vesca*. Darenth (Cooke). Cf. *L. Castaneae*, *supra*.

The spermogone of *Coccomyces dentatus* var. *Castaneae* according to Nannfeldt. It is doubtful if *C. dentatus* is separable from *C. coronatus*, unless their pycnidial stages differ. Both species are reputed to grow on all four hosts—*Betula*, *Castanea*, *Fagus*, and *Quercus*. Tulasne and Phillips both describe "spermatia" 6·5μ long, while Karsten, Saccardo, and Cooke speak of spermatia 12–15μ long, but which size belongs to which (if either) *Coccomyces* nobody knows, though there is a slight suspicion that the shorter spores belong to *C. dentatus*. In both kinds the "spots" are occasionally completely absent; it is probable that they are caused by the mycelium of the perfect stage only. See *Leptothyrium discosioides*, p. 171.

Germ. Denm. Ital.

Leptothyrium botryoides Sacc. in Mich. ii. 168; Syll. iii. 627. All. vii. 332. Died. 710. [*Ceuthospora coronata* v. Höhn. in Mitth. Bot. Inst. Tech. Hochsch. Wien, II, p. 102. *Fusicoccum coronatum* Karst. in Hedwig. 1884, p. 21, *p.p.* Sacc. Syll. iii. 250. *Ceuthospora atra* Lind, in Ann. Mycol. v. 276; Dan. Fung. 434.]

Spots round, pale. Pycnidia amphigenous, scutiform, convex, black, shining, then collapsing and rugose, 120–160μ diam.; texture fuliginous, minutely parenchymatous. Spores cylindrical, straight, tapering but rather obtuse at both ends, cloudy-hyaline, 12–15 $\times$ 2μ; sporophores similar, but more slender. (Fig. 81 *e*.)

On dry fallen leaves of *Fagus silvatica*, *Quercus Robur*, *Q. coccinea*, and on acorns of *Q. Ilex*. Hadzor Hall and Monk Wood, Ws. Mar.

The pycnidial stage no doubt of *Coccomyces coronatus*, in company with which it can be found. It is merely a simplified (i.e. unilocular) state of *Fusicoccum coronatum* Karst., which is really a Ceuthospora as described by Lind and von Höhnel, the Leptothyrium being the (A) and the Fusicoccum the (B) conceptacles; but this compound B-form has not yet been recorded for Britain.

The composition of this species may fairly be compared with the way in which *Phoma Ilicis* Desm. and *Ceuthospora phacidioides* Grev. combine to form the pycnidial phase of *Phacidium multivalve* K. & S.

Germ. Denm. Ital. etc.

Acer

Leptothyrium acerinum Corda, Icon. ii. 25, pl. 12, f. 92. Fckl. Symb. Myc. p. 383, pl. 2, f. 30. Sacc. Syll. iii. 630; Fung. Ital. pl. 1490. All. vii. 323 with fig. Died. 706. Mig. p. 483, pl. 63, f. 1–9. *Pilidium acerinum* Kunze, Myk. Heft. ii. 92, pl. 2, f. 5. Cooke, Handb. p. 440, f. 163.

Spots none. Pycnidia formed only by the discoloured cuticle, hypophyllous, scattered, orbicular, flat, minute, black, at length splitting into 3–5 acute teeth, white within. Spores cylindric-fusoid, arcuate, 10–15 $\times$ 1·5–2μ; sporophores filiform, 10–12 $\times$ 1μ.

On dead or decaying leaves of *Acer Pseudoplatanus*, *A. campestre*. Shere; Neatishead, Norfolk; Sussex; Cheshire; Lancashire; Yorkshire; Derbyshire. Sept.–May.

Externally resembling a *Phacidium*. A specimen on leaves of *A. campestre*, sent by Dr J. W. Ellis from Sussex, had spores 4 $\times$ 1μ, but otherwise was similar.

Fr. Germ. Austr. Denm. Ital. Balkans, Japan.

Leptothyrium Platanoidis Pass. *apud* Brun. Champ. Nouv. vi. 4. Sacc. Syll. x. 413. All. vii. 323. Grove, in Journ. Bot. 1916, p. 219, pl. 543, f. 12. Cf. *Phyllosticta Platanoidis* Sacc. Syll. iii. 13 (in Vol. I, p. 3).

Spots pallid-brown, variable in size. Pycnidia standing singly, but collected into little groups each of which occupies an area bounded by venules (these areas coalesce so as to form a larger ± angular spot), hypophyllous, scutiform, rather prominent, black, 60–100μ diam., opening by a wide pore; wall parenchymatous, smoky-brown. Spores linear, generally quite straight or rarely faintly curved, 4–5 × 1μ, each end obtuse and occupied by an indistinct guttule.

On leaves of seedlings of *Acer Pseudoplatanus*. Park Mill, Gower (J. W. Ellis). Himley Park, Staffs.; etc. Sept. Oct.

Destructive to the young plants; with these specimens was *Phleospora Pseudoplatani* Bub. Passerini gives the size of the spores as 5–7·5 × 1·5μ.

Fr. Germ. Swed.

Achillea

Leptothyrium Ptarmicae Sacc. in Mich. ii. 114; Syll. iii. 635. All. vii. 323. Died. 707. Mig. 484. *Labrella Ptarmicae* "Desm.", B. & Br. in Ann. Nat. Hist. 1838, i. 208; 1876, xvii. 145. Cf. *Schizothyrium Ptarmicae* v. Höhn. Fragm. Myk. no. 929.

"Pycnidia plane, shield-shaped, between elliptic and circular, 300μ diam., mouthless; wall minutely sinuous-prosenchymatous, smoky-brown. Spores ovoid-oblong, clouded, with the protoplasm sometimes indistinctly bipartite, 10 × 6–7μ; sporophores cylindrical, shorter" (Sacc.).

On leaves and stems of *Achillea Ptarmica*. Rannoch (Buchanan White). King's Cliffe, on leaves (Berk.). On leaves and stems, near Ealing (Cooke). *n.v.*

Stated to be the pycnidial stage of *Schizothyrium Ptarmicae* Desm. It is questionable how far this really exists or, if it does, is native. The plants appear to have been brought from France, except those at Rannoch. Mr E. A. Ellis has sent me the perfect Schizothyrium, collected at Spean Bridge, Inverness, by Mr Mayfield in 1932; accompanying it are many undeveloped peridia like those described above, full of oil-drops and the early states of asci and paraphyses, but containing no pycnospores.

Fr. Germ.

Alnus

Leptothyrium alneum Sacc. in Mich. i. 202; Syll. iii. 627. All. vii. 325. Died. 707. Mig. 484. *Melasmia alnea* Lév. in Ann. Sci. Nat. 1848, p. 252. Cooke, Handb. p. 440, f. 164. *Dothidea alnea* Grev. Scot. Crypt. Flor. pl. 146, f. 2. *Discosia alnea* Rab. Fung. Eur. no. 539 (*non* Fr.). *Gloeosporium cylindrospermum* Sacc. Syll. iii. 715; Fung. Ital. pl. 1027 (not *G. alneum* Westd.).

Pycnidia scattered, numerous, epiphyllous, adnate, shield-shaped, convexo-plane, black, shining, at length deeply rugulose, 160–200μ diam. Spores sausage-shaped, obtuse at both ends, curvulous, 8–9 × 1·5–2μ or 10–15 × 2·5–3μ; sporophores subulate, about as long as the spore.

On living and fading leaves of *Alnus glutinosa*. Norfolk (Plowright). Scarborough (Roe). Common in Scotland: Edinburgh; Perth; Dee; Ayrshire; Dumbartonshire; Argyllshire; Forres; Aviemore; etc. Autumn.

The "Alder Leaf-spot"; externally like *Discosia alnea* Fr., but spores different. Sometimes the pycnidia are situated on large olivaceous rounded spots, with a broad brownish border on the upper surface, but the spots are not always present, and the pycnidia may be scattered ± uniformly over the leaf. This fungus is only an advanced state of *Gloeosporium cylindrospermum* Bon. (*q.v. infra*, p. 209) as was proved by Klebahn (Zeitschr. f. Pflanzenkr. 1908, xviii. 140); see also Hedwigia, 1895, p. 275. Its ascophorous stage is *Gnomoniella tubiformis* Sacc., as Klebahn showed.

There is no lasting pycnidial wall; the spore-layer is covered only by the cuticle, except at the very first. *Septoria alnicola* Cooke (*q.v.*, Vol. I, p. 367), seems to be the same species.

Europe, N. America.

Anemone

Leptothyrium Anemones, sp. nov.

Pycnidia amphigenous, covered only by the cuticle, collected in ± linear groups, especially around the edges of the leaves, dimidiate, roundish, about 200μ diam., very convex and protuberant, olivaceous-brown, shining, rugose, pierced by a central pore; texture of sinuous pale-olivaceous hyphae radiating from the centre, the margin slightly fimbriate. Spores oval, ovate, or roundish, 2–3μ diam., arising on the apex of a sporophore, two or three for a long time clinging together in the form of a necklace; sporophores crowded, erect, linear, not perfectly straight, obtuse above, colourless,

reaching up to $20 \times 2{\cdot}5\mu$, and forming a nearly colourless proliferous basal stratum for the pycnidium.

On living leaves of a cultivated *Anemone* (St Brigid), Scilly Islands. Jan.

The spores seem to grow basipetally and hold together in twos or threes.

Aster

Leptothyrium asterinum B. & Br. in Ann. Nat. Hist. 1881, vii. 129, pl. 3, f. 1. Sacc. Syll. iii. 632. All. vii. 325. *Macrophoma asterina* Syd. Mycoth. Germ. no. 1655 (later).

Spots roundish, 2–3 mm. diam., thickened, sometimes surrounded by a red border. Pycnidia crowded, ± circinate, black. Spores very numerous, irregular, oblong, curved, obtuse at the ends or often beaked like those of *L. Periclymeni*, occasionally subconstricted in the middle, granular within, $15\text{–}24 \times 4\text{–}8\mu$, issuing as a white tendril; sporophores linear. (Fig. 81 *a*, *b*.)

On living leaves of *Aster Tripolium*. Fleetwood (Bloxam). Wells, Norfolk, and near Gt Yarmouth, Norfolk and Suffolk (E. A. Ellis). Jun. Jul.

The shield-shaped pycnidium has the same radiating structure as that of *L. Periclymeni*, opening from the centre to the margin in the same way. Berkeley describes the spores as "biguttulate, $25\text{–}38\mu$ long", but this does not agree with my examination of his specimens, which have no doubt shrunken.

Germ.

Berberis

Leptothyrium Berberidis Cooke & Mass. in Grevill. xvi. 9 (1887). Sacc. Syll. x. 413. All. vii. 326. Bubák. Bot. Kozl. 1915, p. (73). *Melasmia Berberidis* Thüm. & Wint. in Fung. Austr. no. 201. Sacc. Syll. iii. 638. All. vii. 372, with fig. Mig. p. 496, pl. 64, f. 8, 9. *Leptothyrium berberidicola* Massal. *apud* Sacc. in Ann. Mycol. iii. 168. *Leptostroma Berberidis* Nannf. Studien, 234.

Spots pale-brown, with a darker brown border, gradually spreading over the whole leaf. Pycnidia mostly epiphyllous, gregarious, round, black, $100\text{–}200\mu$ diam., rather flat but elevated in the centre. Spores cylindrical, slightly curved, $8\text{–}9 \times 1{\cdot}5\text{–}2\mu$ (Cooke), $4\text{–}6 \times 0{\cdot}5\text{–}0{\cdot}75\mu$ (Bäuml.); sporophores linear, erect, palisade-like, $12\text{–}25 \times$ about 1μ.

On living leaves of *Berberis vulgaris*. Ayrshire (Boyd). Oxford (Baxter). Hadzor Hall; Heythrop Park, Oxon.

Autumn.

The pycnidial stage of *Lophodermium Berberidis* Rehm, which can occur on the same leaves after they have fallen. A rather doubtful species; different authors give different dimensions for the spores.

Fr. Germ. Austr. Hung.

Fagus

Leptothyrium discosioides Keissl. *in litt. apud* Sacc. Syll. xxii. 1154. Mig. 486. *Phoma discosioides* Sacc. Syll. iii. 114. *Phyllosticta discosioides* All. vi. 42. Died. 51.

Pycnidia scattered loosely over roundish pallid spots, chiefly epiphyllous, black, depressed, round, erumpent, shining, up to 200μ diam.; wall minutely parenchymatous, dark-brown above, then opaque. Spores allantoid, rounded at each end, about $3 \times 0{\cdot}5$–1μ; sporophores linear, straight, hyaline, 10–18μ long.

On fallen leaves of *Fagus silvatica*. Dodderhill Common, Ws. (Rhodes). Cofton Woods, Ws. Jan.–Mar.

Whether this is really what Diedicke describes (*l.c.*) may be somewhat doubtful, for he says that spots are wanting; but the spores are the same. It is distinctly a Leptothyrium, having a flat brittle shield above, and below an olivaceous proliferous stratum. The cells at the edge of the shield show a faint radial arrangement. But cf. *Leptothyrium quercinum* (p. 165), for Sydow has found this species of Keissler on *Quercus*, but with spores up to 6μ long. He believes that *L. discosioides* and *L. quercinum* are both pycnidial stages of *Coccomyces coronatus*, which he says can grow on both *Quercus* and *Fagus*.

Fr. Germ. Austr.

Fragaria

Leptothyrium Fragariae Smith, in T.B.M.S. 1919, vi. 155.

Spots variable in size, not bordered, reddish-brown. Pycnidia epiphyllous, numerous, scattered or gregarious, punctiform, convex, black, shining, up to 120μ diam.; wall dusky, of radiating texture, irregularly pierced in the centre. Spores cylindrical, straight, 3–6×1–$1{\cdot}5\mu$.

On fading leaves of *Fragaria vesca*. Largs, Ayrshire (Boyd). Feb.

The pycnidia were spread over large areas of the leaf. *Gnomonia Rosae* Fckl. or an ally was also present along the veins on the under surface.

Hedera

Leptothyrium Hederae Starb. Stud. 96. Sacc. Syll. xi. 554. All. vii. 333. Grove, in Journ. Bot. 1918, p. 319, pl. 550, f. 11. *Sphaeria Hederae* Moug. *apud* Fr. Syst. Myc. ii. 564. Sacc. Syll. ii. 436.

Pycnidia subcuticular, amphigenous but mainly epiphyllous, scattered, roundish, flat, then convex, at length rugose and somewhat collapsed, smooth, shining, black, 120–200μ diam., opening by a central pore. Spores cylindrical, straight, $2–2{\cdot}5 \times 0{\cdot}75–1\mu$; sporophores linear-filiform, longer than the spore.

On dead leaves and petioles of *Hedera Helix*. Ayrshire (Boyd). Matlock Bath; Harlech. Dec.–Feb.

The spermogone of *Hypoderma Hederae* de Not, which accompanied it.

The pycnidia are at first smaller, and occur on the upper side, without the ascophorous stage and often sporeless, but afterwards are found on the pallid spots occupied by the latter on both sides of the leaf.

Fr.

Lonicera

Leptothyrium Periclymeni Sacc. Syll. iii. 626. All. vii. 335. Died. 711. Mig. 486. *Labrella Periclymeni* Desm. in Ann. Sci. Nat. 1848, x. 358. *Leptothyrium pictum* B. & Br. in Ann. Nat. Hist. 1875, xv. 33. Sacc. Fung. Ital. pl. 93. *Labrella Xylostei* Fautr. in Rev. Mycol. 1895, p. 168, pl. 157, f. 2. Sacc. Syll. xiv. 995. *Gloeosporium Lonicerae* J. W. Ellis, in T.B.M.S. 1914, iv. 295; v. 137. *Colletotrichella Periclymeni* v. Höhn. Fragm. Myk. no. 983.

Spots somewhat olivaceous, then becoming pale when dry, 6–10 mm. diam., roundish, generally surrounded by a fuscous border. Pycnidia epiphyllous, scattered, immersed, then erumpent, shield-shaped, black, of a distinct radiating texture, at length dehiscing from the centre along radial lines. Spores oblong, obliquely beaked at the upper end, guttulate, $23–25 \times 8–10\mu$.

On living or fading leaves of *Lonicera Periclymenum*. Twycross; Birmingham; Water Orton and Berkswell, Wk.; Devon; Cheshire; Keswick; Ayrshire; Roslin Glen, Glamis; Ballinluig; Forres; etc. On a cultivated *Lonicera*, Devon. Jul.–Sept.

"Spots rufous, here and there paler, when fertile bordered with brown; pycnidia shining, ocellate; spores subcymbiform, rather curved. A very pretty and distinct species" (B. & Br.).

"Easily recognised by the pale-yellow or rufous spots, on which the black pycnidia are produced" (Boyd).

The radial hyphae of the pycnidial wall vanish first at the centre, thus making the shield "ocellate". When it has nearly all vanished, a narrow black circular line is left enclosing a whitish area. It is recorded abroad on *L. Xylosteum* and *L. Caprifolium* also.

Europe generally, N. America.

Osmanthus

Leptothyrium Osmanthi Grove, in Journ. Bot. 1922, p. 142.

Pycnidia amphigenous, crowded, subglobose or lens-shaped, thick, shining and very black, up to 200μ diam., surrounded by a black halo, at the last raising the cuticle and erumpent by a central pore. Spores linear, rounded at both ends, generally straight, 12–13 $\times$ 2–2·5μ; sporophores shorter, about 5 $\times$ 1μ, rising from a thick olive-black stratum.

On dead leaves of *Osmanthus aquifolius* var. *ilicifolius*. West Kilbride, Ayrshire (Boyd). Sept.

Pyrus

Leptothyrium Pomi Sacc. in Mich. ii. 113; Syll. iii. 632. All. vii. 337. *Labrella Pomi* Mont. & Fr. in Ann. Sci. Nat. 1834, i. 347. Thüm. Fung. Pomicol. p. 118. *Microsticta Pomi* Desm. in Ann. Sci. Nat. 1849, xi. 360. Sacc. Syll. iii. 693. All. vii. 443.

Spots none. Pycnidia (?) dimidiate, roundish or elliptical, small, very shining, black; texture somewhat radiating, dusky-brown. No real spores seen (7μ diam. Thüm.).

On the outside of Apples (*Pyrus Malus*). When first noticed, it was very uncommon, but it seems to have spread more widely since. Surrey, Sussex, Middlesex, Berkshire, etc. Sept. Oct.

Forms small sooty blotches on the fruit, consisting of masses of dark mycelium, covered merely by the cuticle. It is only the sclerotial stage of a fungus, for it never contains spores, and in this respect may be compared with the so-called *Phoma deusta*, *q.v.* Massalongo found in Italy f. *majus*, 300–500μ diam., but also without spores (Bull. Soc. Bot. Ital. 1900, p. 255). A similar "fly-speck" has been found on fruit of *Prunus* in America.

Fr. Germ. Austr. Ital. U.S.A. India.

Quercus

Leptothyrium ilicinum Sacc. Syll. iii. 629; Fung. Ital. pl. 1491. All. vii. 340, with fig.

Spots none. Pycnidia amphigenous, but mostly hypophyllous, shield-shaped, rather flat, nearly circular, blackish, 200–350μ diam.; wall parenchymatous, uneven at the margin, dehiscing in various ways. Spores linear, quite straight, obtuse at both ends, at first hyaline, "then very pale-olivaceous", often with two or more guttules, 20–25 × 3μ, seated on a dark olivaceous stratum.

On dead fallen leaves of *Quercus Ilex*. Kew Gardens (Nicholson). Landulph, Cornw. (Hurst).

In the Cornish specimens the pycnidium more often dehisced by a central pore. The pseudoparenchyma of the pycnidium, as is usual in Leptostromataceae, filled the epidermal cells, and destroyed their contents, but not their walls. Does this belong to a *Microthyrium*? Holl. Ital.

Rubus

Leptothyrium clypeosphaeroides Sacc. in Mich. ii. 114; Syll. iii. 631. All. vii. 341. Died. 714. Cf. *L. Rubi*, *infra*.

"Pycnidia gregarious, superficial, shield-shaped, flat, black, shining, about 250μ diam.; texture parenchymatous, rather radiating, thinner in the centre. Spores cylindrical, nearly straight, obtuse at both ends, 5–6 × 1μ; sporophores arising from a dusky proliferous stratum, 7–10 × 1·25μ."

On rotting stems of *Rubus fruticosus*. Cheshire (Ellis). Apr.

Ellis's specimens differ slightly and are as follows: Pycnidia scattered, roundish or oblong, shield-shaped, dark-brown, paler in the centre, polished and shining, at length nearly black, at first flat, then raised in the centre and dehiscing by a minute pore, covered only by the cuticle. Spores very numerous, sublunate, acute at both ends, at first faintly guttulate, 6–8 × 1–1·5μ; sporophores hardly perceptible. Fr.

Leptothyrium Rubi Sacc. in Mich. ii. 351; Syll. iii. 629. All. vii. 341. Died. 713. *Sphaeria Rubi* Duby, Bot. Gall. ii. 712.

Spots numerous, small, roundish or more often angular, scattered over the whole leaf and visible on both sides of it, bleached or pallid, at length coalescing. Pycnidia mostly epiphyllous, shield-shaped, 150–200μ diam., brownish-black;

texture radiating. Spores ± cylindrical, $3 \cdot 5–4 \cdot 5 \times 0 \cdot 5–1\mu$; sporophores linear, $20 \times 1–1 \cdot 5\mu$.

On dry fallen leaves of *Rubus fruticosus*. Darenth (Cooke). Scotland (Trail). Cheshire (Ellis). Ayrshire (Boyd). Worcestershire (Rhodes). Winter.

Even when the spots coalesce, the faint brown lines which bounded the original spots are still evident and make a reticulation of the larger patch. Each original spot often did not contain more than two or four pycnidia. This species may belong to *Coccomyces Rubi* Karst. or *Hypoderma Rubi* de Not.

Fr. Germ. Ital. Alger.

Vaccinium

Leptothyrium melaleucum Grove, in Journ. Bot. 1922, p. 85.

Pycnidia epiphyllous, subcuticular, $250–300\mu$ wide, black, convex, roundish or angular, bursting the cuticle by a stellate fissure; pycnidial wall thin above, occupying and destroying the epidermal cells, similar but slightly thicker below, where it is lined by a nearly hyaline subgelatinous layer, which also extends upwards and divides the cavity into false chambers as in many Cytosporas. Spores copious, linear, straight, obtuse at both ends or subacute below, colourless even in mass, $8–9 \times 1 \cdot 5–1 \cdot 75\mu$, involved in a little mucus; sporophores linear, erect, of about the same length.

On leaves of *Vaccinium Vitis-idaea*. Killin, Perthshire (Boyd), in association with *Lophodermium melaleucum* de Not. July.

On the stems of the same twigs is the thick convex *Lophodermium cladophilum* Rehm, of which *Loph. melaleucum* is probably merely the leaf-form.

Vitis

Leptothyrium perpusillum Pass. & Thüm. Pilz. Weinstock, p. 152, pl. 2, f. 10. Sacc. Syll. iii. 631.

Pycnidia very minute, gregarious, somewhat prominent, conoid, perforating the epidermis, at length free, black. Spores cylindric-ellipsoid, sometimes rather clavulate, straight, obtusely rounded above and somewhat dilated, slightly narrowed below, "1-septate" (? falsely), not constricted in the middle, very abundant, hyaline, $6–8 \times 2 \cdot 5–3\mu$; sporophores linear, curvulous, slightly longer than the spore.

On dry rods of *Vitis vinifera*, especially near the nodes. King's Lynn (Plowright).

The scutiform peridium of these pycnidia extends only over the upper half, the lower wall is nearly colourless. The upper half, being very brittle, breaks away and vanishes completely after the epidermis has disappeared.

There is possibly some close relationship between this species and *Phoma Cookei* Pir. (*q.v.* Vol. I, p. 114).

Ital.

MONOCOTYLEDONS

Carex

Leptothyrium subtectum Sacc. in Mich. ii. 529; Syll. iii. 636. All. vii. 336 (*non* Sacc. & Fautr. Syll. xvi. 989). *Cryptomela caricis* Berk. (*non* Sacc.).

Pycnidia loosely gregarious, covered only by the cuticle, flattened, round or oblong, black, shining, about 250μ diam., opening irregularly or in a circumscissile manner; wall thick below, thin above, of dark-brown thick-walled parenchymatous cells. Spores subfusoid, curvulous, faintly guttulate, $16–20 \times 2{\cdot}5–3\mu$; sporophores erect, obtuse, nearly colourless, $8–10 \times 4\mu$. (Fig. 80, p. 161.)

On dead leaves of *Carex*. Spye Park, Wilts.; Orton, Notts. (Berkeley). Jan.–Apr.

This description is taken from Berkeley's specimens, which are called by Cooke (in Grevill. xiv. 127) *Cryptomela Caricis*, but which differ from that species in having perfectly hyaline spores. Saccardo's *L. subtectum* was on *Luzula*, but the British specimens seem to be the same. It belongs to Diedicke's section C.

Ital. N. America.

Phormium

Leptothyrium Phormii Grove, in Kew Bull. 1921, p. 148, f. 7; and in Journ. Bot. 1922, p. 143. *Coniothyrium Phormium* Cooke, in Grevill. 1879, vii. 96. *Phoma Phormii* Sacc. Syll. iii. 166.

Pycnidia densely aggregated, 200–300μ diam., black, lens-shaped, raising the cuticle in a little ridge, which at length splits away in various forms, mouthless, but the upper part at last disappearing. Spores very numerous, embedded in mucus, singly colourless, hardly coloured in mass, ovoid in face view, oblong in profile, often more or less flattened, faintly guttulate, $3–4 \times 1–2\mu$; no visible sporophores.

On decaying leaves of *Phormium tenax*. Hunterston, Ayrshire; Stranraer, Wigtownshire (Boyd). Aug.–Nov.

? Really a Coniothyrium; *vide supra*, p. 13.

Belg.

Scirpus

Leptothyrium scirpinum Bub. & Kab. in Hedwig. xliv. 356. Sacc. Syll. xviii. 424. Mig. 489. *Leptostroma scirpinum* Fr. Obs. ii. 357; Syst. Myc. ii. 598. Sacc. Syll. iii. 644.

Pycnidia crowded (sometimes on a pallid spot), round or oval, 250–300μ diam., black, opaque, collapsed and flat, but umbonate in the centre and surrounded by a distinct raised margin, at length separating; contents whitish. Spores linear, 4–5μ long; sporophores slender, acicular, twice or thrice as long as the spore, rising from a pale-olivaceous stratum.

On dead culms of *Scirpus lacustris*. Berwick; Loch Fergus, Ayr; Corbie Loch, near Aberdeen; etc. On a dead leaf of *Scirpus lacustris*, Ayrshire (Boyd). Jul.–Sept.

The pycnidial stage of *Hypoderma scirpinum* DC., which is found on the base of the same culms, and is (?) miscalled by Saccardo *forma major* of the Leptothyrium; but cf. the theory described under Fusidomus, p. 113.

Bohemia.

SCHIZOTHYRELLA Thüm. in Mycoth. Univ. no. 1684.

Pycnidia subcuticular, at length free, roundish, black, opening by laciniae. Spores cylindric-filiform, septate, but afterwards breaking up into joints which are themselves septate.

Quercus

Schizothyrella quercina Thüm. Mycoth. Univ. no. 1684. Sacc. Syll. iii. 690. Mig. p. 501, pl. 66. Grove, in Journ. Bot. 1928, p. 137. *Schizothyrium quercinum* Lib. in Roum. Fung. Gall. no. 612.

Ardennes.

Pycnidia variable, roundish, oblong, or angular, dimidiate, black, up to 1 mm. wide, covered by the cuticle, resembling a *Leptostromella*; texture dark-fuscous, prosenchymatous. Spores cylindrical, septate, about $15 \times 1{\cdot}5\mu$, concatenate, (? 5–6-septate, Mig.); sporophores similar, but long, erect,

parallel, filiform, hyaline, densely crowded, 1·8μ broad and 50μ long or more.

On the underside (rarely on the upper) of old dead leaves of the previous year of *Quercus pedunculata*. Monk Wood, Ws., with a fungus which in the Journal of Botany (*l.c.*) is called *Henriquesia quercina*, but which may be merely an old state of *Coccomyces coronatus* de Not. Oct.

Ardennes.

PIGGOTIA B. & Br. in Ann. Nat. Hist. 1851, vii. 95.

Pycnidia rather flat, unequal, thin, often stellately divided, blackish. Spores ± cylindrical, continuous, colourless or faintly yellowish, on straight sporophores.

Ulmus

Piggotia astroidea B. & Br. in Ann. Nat. Hist. 1851, vii. 95, pl. 5, f. 1. Cooke, Handb. p. 441, f. 165. Sacc. Syll. iii. 637; Fung. Ital. pl. 1492. All. vii. 345, with fig. Died. 715. Mig. p. 490, pl. 63, f. 14–17. *Asteroma Ulmi* Grev. Flor. Edin. 368.

Pycnidia epiphyllous, between the cuticle and the epidermal cells, slightly prominent, black, shining, 50–250μ diam., connate and forming small tubercles which are stellately but irregularly aggregated, often on faint yellowish spots. Spores obovate-oblong, truncate below, rounded above, 8–10 × 5–6μ, often with 2–4 minute guttules, singly subhyaline, but in mass pale olivaceous-yellow; sporophores crowded, cylindrical, occasionally septate, yellowish-brown, truncate, then rounded at the apex, 15–20 × 4–5μ, rising from a compact dark-brown small-celled parenchymatous stratum.

On living leaves of *Ulmus campestris*. Common: England, Scotland, Ireland, but generally sporeless. Jun.–Sept.

A forerunner of *Dothidella* (*Phyllachora*) *Ulmi* Wint., with which it occurs, although rarely on the same leaves. The shape of the spores is much that of the keystone of an arch, but rounded off at the extreme corners. Cf. also *Placosphaeria Ulmi*, Vol. I, p. 243, and *Septogloeum Ulmi*, *infra*, p. 291.

Diedicke, while noting that the spores are said to be in short chains, states that he himself was not able to find any. He also describes

the peridial wall as consisting of two distinct parts, the upper wall thin, small-celled, fuscous-brown and parenchymatous, the lower similar but darker-brown and bearing above it a thicker layer of erect palisade-like hyphae, thus resembling his Section C of Leptothyrium.

Fr. Germ. Denm. Austr. Ital. Spain.

[**Piggotia Gladioli** Pim, in Irish Nat. 1898, vii. 185. See British Association Guide to Dublin, 1878, p. 160. Monkstown, Co. Dublin (G. Pim), 1876.] No description of this fungus seems to have been published, nor is any specimen known to exist.

LEPTOSTROMA Fr. Obs. Myc. ii. 361.

Pycnidia dimidiate, nearly superficial, covered only by the thin cuticle, flat, elongated, black, often shining, marked above by a longitudinal keel or groove. Spores ovoid, oblong, or allantoid, unicellular, nearly or quite hyaline.

Differs from Leptothyrium in dehiscing by an elongated longitudinal fissure.

Plurivorous

Leptostroma herbarum Link, Handb. iii. 345. Sacc. Syll. iii. 645. All. vii. 348. Died. p. 716, p. 690, f. 7. Mig. 491.

Pycnidia gregarious, often confluent, flat or slightly convex, covered at first by the thin cuticle, lanceolate or oblong, marked by an indistinct fissure, fuscous-black, dull or somewhat shining. Spores sausage-shaped or fuscoid and curved, $4–6 \times 1–1{\cdot}5\mu$.

On various herbaceous stems, e.g. *Angelica*, *Campanula*, *Carduus*, *Euphorbia*, *Sisymbrium*, *Teucrium*, *Valeriana*. No doubt a collective species. Kew; Cheshire; Berwick; Ayrshire and several other places in Scotland. Nov.–Apr.

Usually roundish or oblong and quite flat, black, often with a narrow fuscous border. *Fraxinus* and *Salix* are also mentioned in books as hosts, but doubtless incorrectly.

Europe, Siberia.

Eupatorium

Leptostroma Eupatorii Allesch. in Ber. Bayer. Bot. Ges. iv. 36. Sacc. Syll. xiv. 994. All. vii. 349. Died. 719. Mig. 491.

Pycnidia densely gregarious, often arranged in little cloudy groups or lines, round or oblong, $100–200\mu$ diam., but very

frequently confluent, blackish, somewhat rugged, flat or gently convex, at first covered by the cuticle, then opening by a narrow slit; wall distinctly parenchymatous in texture, somewhat radiating, but continuous and not fibrillose at the margin, dark-olive-brown above, paler below and completely enclosing the spores. Spores linear or bacillar, nearly always straight, obtuse and faintly guttulate at each extremity, 7–9 × 2μ; sporophores very short.

On dead stems of *Eupatorium cannabinum*, by the side of a stream, Towyn, Mer. Cf. *Phoma Eupatorii* Died. 896.

Apr.

Germ.

Glechoma

[**Leptostroma Glechomatis** B. & Br. in Ann. Nat. Hist. 1875, xv. 33. Sacc. Syll. iii. 647. All. vii. 359.

"Spots tawny. Pycnidia irregular, epiphyllous, minute. Spores minute, oblong."

On leaves of *Glechoma hederacea*, Scotland.

This is not a fungus, but the result of the ravages of a leaf-miner. Original specimen examined.]

Larix

Leptostroma laricinum Fckl. Symb. Myc. 256. Sacc. Syll. iii. 641. All. vii. 351. Died. 720. Mig. 491.

Pycnidia subgregarious, circular or oval, about 300μ long, convex, at length flattened, plicate, fragile, very black and shining. Spores oval, about 3μ long, on rather long and subulate sporophores.

On dead leaves of *Larix europaea*, Ardrossan, Ayrshire (Boyd).

Apr.

The pycnidial stage of *Lophodermium laricinum* Fckl. There was no sign of the pallid spot mentioned by Fuckel, because the leaves were dead and altogether of a pallid colour.

Germ.

Pinus

Leptostroma Pinastri Desm. in Ann. Sci. Nat. 1843, xix. 338. Sacc. Syll. iii. 641. All. vii. 353. Died. 721. Mig. 492.

Pycnidia oval or linear, 0·5–1 mm. long, black, shining, at first covered, then opening by a fissure; wall thick and opaque. Spores very numerous, cylindrical, obtuse at both

ends, nearly straight, hyaline, $5–8 \times 0·5–1\mu$; sporophores fasciculate, about as long as or longer than the spore.

On leaves and cones of *Pinus silvestris*, *P. austriaca*. Ayrshire (Boyd). Sutton Coldfield Park; Tanworth-in-Arden; Mickleham, etc. Jun.–Sept.

The pycnidial stage of *Lophodermium Pinastri* Chev. with which it frequently grows intermixed.

This must not be confused with *Phoma acicola* Sacc., which has much broader spores. My specimens have exactly the same spores as Desmazières', though differing in outward appearance.

Fr. Germ.

Rubus

Leptostroma virgultorum Sacc. in Mich. ii. 350; Syll. iii. 639. All. vii. 354. Died. 716.

Pycnidia nearly superficial, flat, shield-shaped, oblong, black, shining, marked with a spurious groove. Spores cylindrical-oblong, $4–6 \times 1\mu$; sporophores filiform, fasciculate, $20–25 \times 1–1·5\mu$.

On dead branches of *Rubus fruticosus*. Bungay; Fineshade, Northants.; Weybridge; Barnet; Cotterstock; Shrewsbury; Cornwall; Montgomeryshire; etc. Autumn, winter.

Undoubtedly the pycnidial stage of *Hypoderma virgultorum* f. *Rubi* DC., and quite distinct from *Leptothyrium vulgare* Sacc.

Fr. Germ. (on *Clematis* also), Denm.

Spiraea

Leptostroma spiraeinum Vestergr. Microm. rar. sel. no. 538. Grove, in Journ. Bot. 1916, p. 219, pl. 543, f. 11. *L. herbarum* var. *spiraeinum* Sacc. & Bri. Flor. Crypt. Aube, p. 416. Sacc. Syll. x. 420. *Placosphaeria clypeata* Bri. & Har. in Journ. Botanique, 1891, v. 171. Sacc. Syll. x. 234. All. vi. 544. Died. 305. Mig. 223.

Pycnidia immersed, oblong-lanceolate or elliptical, 0·5–2 mm. long, arranged with the long axis longitudinally on the stem, pale at first but soon becoming black and shining, usually still pale in the centre which is slightly elevated and at length split longitudinally. Spores oblong-linear, sometimes faintly curved, very obtuse at both ends with a polar guttule close to each extremity, $6–9 \times 1·5–2\mu$, almost sessile on a thick pale-olivaceous basal stratum.

On dry stems of *Spiraea Ulmaria* and cultivated species of *Spiraea*. Ayrshire (Boyd). Cheshire (Ellis), with spores

6–8 × 2–2·5μ. Kew Gardens; Studley Castle, Middleton, and Sutton Coldfield, Wk.; Hartlebury Common, Ws.; Flintshire; etc. Mar.–Jun.

I am of opinion that, not this as has been suggested, but *Phoma Spiraeae* Desm. (which is a Phomopsis) is the pycnidial stage of *Diaporthe Lirella*. See Vol. I, p. 221. The Leptostroma has a thin parenchymatous outer layer, and a thicker pale-olivaceous basal layer, composed of a mass of parenchymatous cells (filled with oil), which become more elongate upwards and bear the spores on their pointed upper ends.

Fr. Germ. Denm.

Stellaria

Leptostroma Stellariae Kirchn. in Lotos, 1856, p. 204. Sacc. Syll. iii. 647; xvi. 990. Mig. 492. Ellis, in T.B.M.S. 1914, iv. 294.

Pycnidia mostly epiphyllous, scattered, ± in longitudinal series, oval, at first convex, smooth and shining, black, 250–300μ long, at length dehiscing in a hysteriiform manner. Spores ellipsoid to cylindric, rounded at both ends or subacute below, straight or curvulous, frequently biguttulate, 7–9 × 2–2·5μ. (Fig. 82 *a*.)

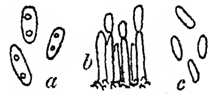

Fig. 82. *Leptostroma*: *a*, spores of *L. Stellariae*; *b*, of *L. filicinum*, *in situ*; *c*, of *L. filicinum*, free; all × 600.

On dead lower leaves of *Stellaria Holostea*. Bromborough, Cheshire (Ellis). Nov.

Probably the pycnidial stage of *Phyllachora Stellariae* Lib.

Holl. Bohem.

MONOCOTYLEDONS, ETC.

Carex

Leptostroma caricinum Fr. Obs. ii. 361, pl. 7, f. 4. Cooke, Handb. p. 416, f. 149. Sacc. Syll. iii. 645. All. vii. 359. Died. 717.

Pycnidia roundish, unequal, thin, opaque, wholly seceding, situated on a fuscous spot. "Black, not 2 mm. long" (Sacc.).

On dead leaves of *Carex*, Spye Park, Wilts. (Broome). On *Carex remota*, Ockeridge Wood, Ws. (Rhodes). On *Carex*, Scotland, frequent.

Dr Rhodes' specimen has spores, sausage-shaped, 3·5–4 × 0·5–0·75μ. In Broome's dubious specimen the pycnidia are smaller, often oblong or linear, and have a tendency to be arranged in lines; no spores. In those which Diedicke found on *Eriophorum* and referred

to this species, he could find no spores. The Glamis specimen called by Berkeley *L. caricinum* is, I think, on Luzula, and is in every respect identical with *L. Luzulae* Lib. (see *infra*). A specimen from Canada under the name *L. caricinum* has spores 18–24 × 3 μ, and appears to be = *Leptothyrium subtectum*.

Fr. Germ. Denm. Swed. N. America.

Juncus and **Luzula**

Leptostroma Juncacearum Sacc. in Mich. ii. 352; Syll. iii. 644. All. vii. 350. Died. 719. Mig. 491. Not *L. juncinum* Fr. (*q.v.* p. 194).

Pycnidia shield-shaped, rather flat, ovate, black, somewhat shining, up to 500 μ long, marked with an indistinct fissure; texture parenchymatous, not radiating. Spores abundant, cylindrical or subfusoid, sometimes biguttulate, 4–5 × 0·5–1 μ; sporophores densely fasciculate, rod-shaped, hyaline, 10 × 1–1·5 μ.

On dead stems of *Juncus conglomeratus*. Longdon Green, St.; Quinton, Ws. On *Juncus communis*, Ayrshire and Dumfriesshire (Boyd); Trench Woods, etc., Ws. On *Juncus maritimus*, St Ives, Cornwall. Apr.–Sept.

The following variety, on *Luzula*, may for the present be distinguished:

Var. **Luzulae.**

Leptostroma Luzulae Lib. Crypt. I, no. 75 (1830). Sacc. Syll. iii. 644; x. 421. All. vii. 352. Mig. 492.

Pycnidia subgregarious, occurring more especially toward the tip of the leaf, sometimes thinly scattered, oval or roundish, up to 500 μ broad, pitchy-black, flat or slightly convex, striate, often marked with a distinct longitudinal fissure or at first by a pore. Spores cylindrical, sometimes faintly curved, 3–5 × 0·5–1 μ.

On *Luzula*, Glamis (Berk. under the name *L. caricinum*). On dead leaves of *Luzula silvatica*, Cawdor Woods, Dee (Ellis). Forres.

An authentic specimen of Madame Libert's Crypt. Ard. no. 75, on examination, was seen to have spores as above described, thus removing Saccardo's expressed doubt.

Europe, Siberia.

Psamma

Leptostroma donacinum Sacc. Syll. iii. 642. All. vii. 347.

Var. **majus** Trail in Scot. Nat. 1886, p. 267.

Pycnidia elliptical or slightly irregular, 1–2 mm. long, 200–300μ broad, black, shining, with a hardly perceptible slit (when dry). Spores cylindrical, 4–5 × 1–1·5μ; sporophores twice or thrice as long.

On the dead culm of a Grass, near Aberdeen (Trail). On dead culms of *Psamma arenaria*, Borth. Dec.–May.

Considered by Trail as a variety, but differing merely in its larger pycnidia, those of the type measuring 250–500 × 10μ only. The original species was found on *Arundo Donax*, but a subspecies is recorded on *Bambusa*.

Fr. Port.

Osmunda

Leptostroma osmundicola Bubák & Sydow, in Ann. Mycol. 1915, xiii. 8.

Pycnidia occupying numerous small linear-lanceolate (or if very small roundish) longitudinal, hardly shining, faintly striate black flecks, mostly 0·5–3 mm. long, each surrounded by a faint greyish-black halo, ? not marked by an elevated ridge. Spores oval-oblong, rounded at both ends, rarely curvulous, hyaline, 6–8 × 2–3μ; sporophores linear, erect, narrow, about as long as the spore, rising from a thin colourless basal stratum.

On dead petioles (stipes) of *Osmunda regalis*. In a garden, Lostwithiel, Cornwall; Crunwere, Pembroke (Rhodes). May–Aug.

Germ.

Pteridium

Leptostroma filicinum Fr. Syst. Myc. ii. 599. Sacc. Syll. iii. 645. All. vii. 358. Died. p. 716, p. 690, f. 6. Mig. 493. T.B.M.S. 1931, p. 85.

Pycnidia elongated, of various shapes, smooth, black, shining, flat, but when mature marked with an elevated median line or ridge, at length often wholly seceding; texture not radiating. Spores oblong or linear, curvulous, 4–5 × 1–1·5μ; sporophores linear-oblong, sometimes acute, 10–12 × 1·5μ. (Fig. 82 *b*, *c*, p. 182.)

On dead petioles of *Pteridium aquilinum*. Very common.

The pycnidial stage of *Rhopographus filicinus*; it is, however, rarely found with pycnospores, merely filled with a subsclerotial mass of cells, 3–5 μ diam., the forerunner of the ascophorous stage. It is recorded also on petioles of *Aspidium* and *Osmunda*. *Pycnothyrium litigiosum* may often be found upon the same petioles, but occupying different patches, not intermingled.

Europe, U.S.A.

LABRELLA Fr. Syst. Orb. Veg. i. 364.

Pycnidia more or less incomplete and dimidiate, lying beneath the cuticle, roundish, black, dehiscing in various ways, but not by a slit. Spores oblong, fusoid, or globose, one-celled, hyaline, not in chains.

The apparent pycnidia often consist rather of the discoloured matrix than of a distinct peridium. A very uncertain genus.

For *Labrella Ptarmicae*, see p. 168.

For the much disputed *Labrella Arbuti* Sacc. = *Cheilaria Arbuti* Desm. see Vol I, pp. 123–4; this species is mostly found in an undeveloped state.

Corylus

Labrella Coryli Sacc. Syll. iii. 648. All. vii. 363. *Cheilaria Coryli* Rob. & Desm. in Ann. Sci. Nat. 1853, xx. 226. Cooke, Handb. 455.

Spots rufous, irregular in size and shape. Pycnidia amphigenous, but often only hypophyllous, subgregarious, innate, very small, hardly discernible, roundish, membranaceous, pallid-brown, dehiscing by a fissure; contents white. Spores oblong, somewhat truncate at the ends, slightly clavate or fiddle-shaped, faintly granular within, $12–15 \times 5 \mu$.

On leaves of *Corylus Avellana*. Bute, Arran, and Ayrshire (Boyd). Highgate; Swanscombe; etc. Jul.–Nov.

On the same leaves may sometimes be found *Phyllactinia suffulta*, but the mature cleistothecia of that species are at least four times as wide as the pycnidia of the Labrella; also with the Labrella may occur *Phyllosticta Coryli*, *q.v.* Vol. I, p. 13.

Fr. Belg. Ital.

Wood

Labrella ligni, sp. nov.

Pycnidia scattered, rarely subconfluent, shield-shaped, ob-

long, oval, or lanceolate, up to 600μ long, chestnut-black, somewhat shining, at length wrinkled, umbonate or even furnished with a longitudinal ridge, at length dehiscing widely; contents pallid-whitish. Spores abundant, fusoid-lunulate (crescent-shaped), 10–12 × 1–1·5μ. (Fig. 83.)

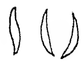

Fig. 83. *Labrella ligni*: spores, × 600.

On outer surface of a decorticated log (? Sycamore). Abbey Wood (Frederick Currey). Aug.

Closely allied to *Labrella Punctum* Corda, but much larger and dehiscing more irregularly. The spores of *L. Punctum* are given by Corda as of about the same length, but that fungus is described and figured as very minute, scarcely visible to the naked eye.

MELASMIA Lév. in Ann. Sci. Nat. 1846, xv. 276.

Pycnidia subcuticular, dimidiate, membranaceous, flat, black, seated in a stroma which is black or blackish and effused in a leaf (rarely in a twig), opening by long and flexuous slits. Spores sausage-shaped, curvulous, one-celled, hyaline; sporophores linear, often longer than the spore.

The pycnidial stage of Rhytisma.

Acer

Melasmia acerina Lév. in Ann. Sci. Nat. 1846, p. 276; 1848, p. 252. Cooke, Handb. pp. 440, 756. Sacc. Syll. iii. 637. All. vii. 371, with fig. Died. 723. Mig. p. 495, pl. 64, f. 6, 7.

Pycnidia epiphyllous, subcuticular, adnate, densely gregarious or confluent and forming large (up to 10 mm. wide)

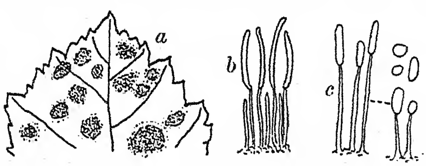

Fig. 84. *Melasmia*: *a*, apex of leaf of *Acer Pseudoplatanus*, affected by *M. acerina*; *b*, spores and sporophores of *M. acerina*, × 1000; *c*, two kinds of stylospores of *M. salicina* (after Tulasne), × 1000.

roundish black pustular patches which are surrounded by a broad yellowish zone; each pycnidium at first hemispherical, then flattened, membranaceous, rugulose, reddish-brown. Spores very abundant, somewhat sausage-shaped, exceedingly

slender, slightly curved, obtuse at both ends, 6–9 × 0·5–1 μ; sporophores crowded, erect, cylindrical, longer than the spore. (Fig. 84 *a*, *b*.)

On living and fading leaves of *Acer Pseudoplatanus* and *A. campestre* (on the Continent reported also on *A. platanoides*). Common wherever the trees are grown. Jul.–Oct.

The pycnidial stage of *Rhytisma acerinum*, into which it is gradually transformed during the winter, the young ascophorous hymenium being discoverable in February on the fallen leaves. The ascospores mature and are discharged in early spring (April, May) just as the leaf-buds of the host are beginning to expand.

Europe, N. America.

Melasmia punctata Sacc. & Roum. in Mich. ii. 632. Sacc. Syll. iii. 638. All. vii. 371. Mig. 495.

"Spots round, 1–5 mm. diam., yellowish. Pycnidia epiphyllous, flattened, black, somewhat superficial, very minutely areolate, at length sometimes confluent. Spores sausage-shaped, 4–6 × 1 μ; sporophores cylindrical, rather long, simple or branched, bearing the spores at the apex and sides."

On living leaves of *Acer Pseudoplatanus* and *A. campestre*. Less often seen than *M. acerina*.

I am of opinion, in spite of the still-continued allegations to the contrary (see Mig. Ascom. 870), that *Melasmia punctata* is merely a less-developed state of *M. acerina* with somewhat shorter spores; both can be found on the same leaf, passing one into the other, as the supposed ascophorous states *Rhytisma punctatum* and *R. acerinum* also do. Müller (Centralbl. f. Bakter. 1913, xxxvi. 67–78, with 4 plates) and others have considered that the forms of Rhytisma on *A. Pseudoplatanus*, *A. campestre*, and *A. platanoides* are biologically distinct.

Empetrum

Melasmia Empetri Magn. in Ber. Deutsch. Bot. Ges. 1886, iv. 104. Sacc. Syll. x. 419. All. vii. 373. Died. 724. Mig. 496. T.B.M.S. vii. 84. *Rhytisma Empetri* B. White (*non* Fr.); see Ann. Nat. Hist. 1876, xvii. 129.

Pycnidia black, covered, vesiculose, rather prominent, irregular above; upper wall thick, black and indistinct, lower wall of palisade-like rows of pluriguttulate cells which are reddish-brown. Spores cylindric-oblong, rounded at both ends, slightly constricted, 12–17 × 3·5–4·5 μ, granular within,

hyaline; sporophores fasciculate, rod-like, simple, four times as long as the spore.

On living twigs of *Empetrum nigrum*. Ayrshire, near Muirkirk, 1944 ft.; Largs; on mountains in Mid Perthshire (Boyd). Braemar; Rannoch (White); etc. Also collected at height of 2500 ft. in Arran, in May (Wilson). Wales?

Sept. Oct.

This fungus has nothing to do with Rhytisma (*sens. strict.*); it causes internodes to elongate, and is said to belong to *Duplicaria Empetri* Fckl. (*Rhytisma Empetri* Fr.).

Germ. Swed.

Salix

Melasmia salicina Lév. *apud* Tul. Carp. Fung. iii. 119, pl. 15, f. 15–17. Sacc. Syll. xxii. 1156.

Spots epiphyllous, blackish, 1 mm. diam. or more, umbonate, obtuse, containing 1–3 minute subcuticular pycnidia, 130–160μ diam. Spores very abundant, linear-cylindrical, obtuse at both ends, straight, 5–6μ long, at length issuing as a tendril, sporophores, crowded, linear, 16–23μ long, rising from a pallid basal stratum. (Fig. 84 *c*.)

On leaves of *Salix Caprea, S. aurita, S. viminalis*. North Wootton and Ely (Plowright). Ayrshire (Boyd). Olton Reservoir, near Birmingham. Aug.–Oct.

The pycnidial stage of *Rhytisma salicinum* Fr.

The spots afterwards become enlarged into the ascophorous stromata, which measure 2–5 mm. wide and are convex, very black, and marked with flexuous wrinkles. According to Tulasne, during the process of enlargement, another kind of spore, globose-ovoid, $3{\cdot}5 \times 1{\cdot}5$–$2{\cdot}5\mu$ may be produced before the asci and ascospores appear. But this fungus is rarely found with spores of any kind; it is mostly seen as a sterile stroma.

An allied fungus found on branches of Willow, *Rhytisma maximum* Fr. (*Cryptomyces aureus* Mass., *C. Wauchii* Grev.) has ovoid pycnospores, about $5 \times 3\mu$, to which no special name has been given; for these see Tulasne, Carp. iii. 121, pl. 16, f. 11, 12, and cf. Plowright, in Grevill. iv. 28, pl. 53, f. 6, 7.

Europe.

APOMELASMIA, gen. nov.

Differing from Melasmia in not opening by long fissures, but by a pore or irregularly.

It is not closely allied to Melasmia, but approaches nearer

to Placosphaeria, or even in some respects to Phomopsis which in its earlier states frequently resembles the Leptostromataceae.

Urtica

Apomelasmia Urticae, comb. nov. *Xeilaria Urticae* Lib. Crypt. I, no. 62 (1830). *Melasmia Urticae* Grove, in Journ. Bot. 1918, p. 319, pl. 550, f. 10. *Placosphaeria Urticae* Sacc. Fung. Ardenn. no. 153; Syll. x. 236. All. vi. 545. Died. 305. Mig. 224.

Pycnidia convex, about 500μ long, black, rather shining, arranged in longitudinal rows, immersed in a stroma which is black and surrounds the stem (with interruptions) for several inches, at length opening by a pore or a short fissure. Spores linear, often tapering at both ends, especially below, frequently bent, curved, or irregular, colourless, cloudy, granular and guttulate, $22–32 \times 3–4{\cdot}5\mu$; sporophores erect, crowded, linear, very pale reddish-brown, a little shorter than the spore, rising from a dark-brown stratum. (Fig. 85.)

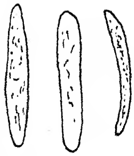

Fig. 85. *Apomelasmia Urticae*: spores, $\times 600$.

On dead fragile stems of *Urtica dioica*. N. Wootton (Plowright). Ayrshire (Boyd). Near Aberdeen (Trail). Feb. Mar.

In company with *Aporhytisma Urticae* v. Höhn. (in Ann. Mycol. 1917, xv. 318), of which it is the pycnidial stage. As pointed out by Petrak (in Ann. Mycol. 1927, xxv. 211) Aporhytisma belongs to the true Pyrenomycetes, not to the Phacidieae, and so Apomelasmia is more closely allied to Phomopsis than to Melasmia.

Ardennes, Holstein.

DISCOSIA Lib. Exs. no. 345.

Pycnidia dimidiate, discoid, immersed, then free, easily separating, black, often shining, thin. Spores oblong or sausage-shaped, with two or more (usually three) septa, hyaline or faintly coloured, furnished at each end with a single cilium which is affixed just beneath the extremity.

Plurivorous

Discosia artocreas Fr. Summ. Veg. Sc. 423. Sacc. Syll. iii. 653; Fung. Ital. pl. 1488. All. vii. 377, with fig. Died. p. 725, p. 718, f. 11 *b*. Mig. p. 498, pl. 65, f. 1–5. *Sphaeria artocreas* Tode, Fung.

Meckl. ii. 77. *D. alnea* Cooke, Handb. p. 439, f. 162, *p.p.* Died. 726. Mig. 498. *D. faginea* Lib. Ard. no. 345. *Cryptostictella bractearum* Grove, in Journ. Bot. 1912, p. 52, pl. 516, f. 11 (with occasionally five septa).

Pycnidia scattered or gregarious, amphigenous, immersed, then free, dimidiate, orbicular, 100–300μ diam., black, at first shining, convex, and smooth, soon depressed and rugose-plicate; texture of shield brittle, opaque, indistinctly radiating. Spores slightly curved, sausage-shaped, 3-septate, sometimes yellowish, 14–24 $\times$ 2–3·5μ, furnished on one side of the rounded apex, on the inside of the curve, at each extremity, with a delicate fugacious seta 10–15μ long; sporophores conical, pallid, about half as long as the spore, springing from a cushion-like olivaceous-brown parenchymatous stratum. (Fig. 86.)

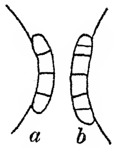

Fig. 86. *Discosia*: *a*, spores of *D. artocreas*; *b*, of *D. artocreas*, f. *bractearum*; both $\times$ 600.

On fallen leaves and bracts of *Tilia europaea*, Oscott College; Studley Castle, Wk. On living or fading leaves of *Fagus silvatica*, Shere; Oscott; Dupplin Castle, Perth. On leaves of *Quercus*, Kew. On leaves of *Betula alba*, Ayrshire (Boyd). On leaves of *Carpinus*, Cannon Hill Park, Birmingham. On dead leaves of *Magnolia grandiflora*, Landulph, Cornw. (Hurst). On dead herbaceous stems, Kew Gardens. On *Epilobium hirsutum*, Norfolk (E. A. Ellis). Dec.–Apr.

It has been recorded abroad on a very great number of other trees, shrubs, and herbs (doubtless it is a collective species), viz. *Acer*, *Aesculus*, *Agrimonia*, *Corylus*, *Crataegus*, *Juglans*, *Mespilus*, *Platanus*; *Populus*, *Pyrola*, *Rubus*, *Sorbus*, *Ulmus*, etc.

The form called *Discosia alnea*, on fading leaves of *Alnus*, is said to differ from *D. artocreas* merely in being scattered, not gregarious, and could not be anything but a form of that species. It is recorded from Wales and Scotland, but all the British specimens I have seen under this name seem to be *Leptothyrium alneum*.

Some of the fungi formerly placed in Cryptostictis or Cryptostictella, with an imperfectly formed peridium, really belong to Discosia, e.g. *C. bractearum* Grove.

Europe, U.S.A., Canada.

ENTOMOSPORIUM Lév. *apud* Moug. in Stirp. Crypt. Voges. no. 1457.

Pycnidia incomplete, convex-flattened, black, subcuticular, without a pore, but opening widely when older. Spores cruciately four-celled, consisting of two larger superposed cells with two (rarely three) smaller ones attached laterally at their junction; the three (or four) upper cells each uniciliate.

Rosaceae

Entomosporium maculatum Lév. in Moug. Stirp. Vog. no. 1458. Sacc. Syll. iii. 657. All. vii. 384, with fig. (on *Mespilus*). Died. p. 728, p. 718, f. 12 *b* (var.). Mig. 500. Massee, Dis. Cult. Pl. p. 452, f. 138. Duggar, Fung. Dis. Pl. p. 365, f. 183–6. U.S. Dept. Agric. Rep. 1888, p. 357, pl. 8, 9. Stevens, p. 149, f. 106.

Spots small, round, reddish. Pycnidia epiphyllous, flattish, almost mouthless, black. Spores cruciately 4-celled, 18–23 × 10–12μ; cells ± oval, colourless, oily-granular within, the side-cells smaller, laterally compressed, each cell except the lowest furnished with a hyaline seta, the lateral setae usually shorter than the apical one; sporophores filiform, 15–20 × 0·75μ. (Fig. 87.)

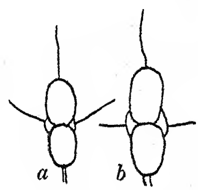

Fig. 87. *Entomosporium maculatum*: *a*, spore of the type; *b*, of var. *Mespili*; both × 600.

On leaves and fruits of *Pyrus*, *Eriobotrya*, *Cydonia*, and *Mespilus* (and abroad on other rosaceous fruit-trees, e.g. *Cotoneaster*). Uncommon: Southern England; Sussex on *Cydonia*, Maidstone on *Mespilus*, Cornwall on *Photinia* (*Eriobotrya*) *japonica*; etc.

Considered to be the pycnidial stage of *Fabraea maculata* Atk. (see Science, new ser. 1909, xxx. 452). It causes a cracking of the pear-fruit much like that caused by Fusicladium.

The following three forms are described:

Var. **domesticum** Sacc. on *Mespilus*, smaller in all its dimensions than *E. maculatum*, but lateral setae longer.

Var. **Mespili** Sacc. (*Morthiera Mespili* Fckl. Symb. Myc. p. 382, pl. 2, f. 25) on *Cotoneaster*, *Cydonia*, *Pyrus silvestris*, *Mespilus*, *Amelanchier*, etc., with the lateral cells larger and more rounded, the

pedicels thicker, and the lateral setae shorter. The pycnidial stage of *Fabraea Mespili* Atk.

Var. **Cydoniae** Cooke & Ellis, in Grevill. vi. 84, pl. 99, f. 3, with spores $12–15 \times 6{\cdot}5\mu$. I have found the lower cell on *Cydonia* to measure $4–6 \times 3–4\mu$; the upper cell $8–12 \times 6–8\mu$, and the lateral cells $2–3\mu$ broad; the setae $10–15 \times 0{\cdot}5–1\mu$.

Fr. Germ. Denm. Ital. Tyrol, Swed. U.S.A. India.

DICTYOTHYRIUM Grove, in Journ. Bot. 1932, p. 3.

Pycnidia subcuticular, erumpent, black, subcarbonaceous. Spores oblong, hyaline, pluriseptato-muriform.

It is, as it were, a Camarosporium, with hyaline spores, and Leptothyrium-like pycnidium.

Betula

Dictyothyrium Betulae Grove, in Journ. Bot. 1932, p. 3, pl. 599, f. 10.

Pycnidia scattered, scutiform, oval, convex, covered only by the cuticle, black, shining, $300–500\mu$ diam., surrounded by a brownish halo formed by the mycelial hyphae; texture of very minute rounded brown cells which are ± prosenchymatous and rather loosely bound together. Spores obovoid or soleiform, perfectly hyaline, rounded above, often attenuated below, at first 1-septate, then transversely 3–4-septate, with 1–3 of the loculi at length divided by an oblique or longitudinal septum, occasionally constricted (especially at the middle septum), $15–22 \times 5{\cdot}5–8\mu$; sporophores not seen. (Fig. 88.)

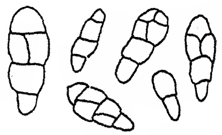

Fig. 88. *Dictyothyrium Betulae*: spores, × 600.

On the bark of small twigs of *Betula alba*, Thurstaston Common, Wirral, Cheshire (Travis). July.

Spores similar to those of Hyalothyridium Tassi.

LEPTOSTROMELLA Sacc. in Mich. ii. 632.

Pycnidia as in *Leptostroma*, but spores long and filiform, often multiguttulate, or even faintly pluriseptate.

Plurivorous

Leptostromella hysterioides Sacc. Syll. iii. 659. All. vii. 389,

with fig. Died. p. 729, p. 718, f. 9. Mig. p. 500, pl. 65, f. 10–13. *Leptostroma hysterioides* Fr. Syst. Myc. ii. 600.

Pycnidia gregarious, oblong, black, up to 1 mm. long, opening by a slit or a wide ostiole, wholly seceding. Spores fusoid-filiform, curved, granular within, $20–28 \times 2\mu$, continuous, hyaline, but often containing a row of guttules. (Fig. 89*a*.)

On dry stems of various plants. On *Centranthus ruber*, West Looe, Cornw. (Rhodes). On *Leycesteria*, Polperro (Rhodes). July.

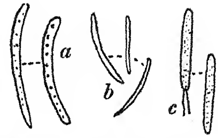

Fig. 89. *Leptostromella*: *a*, *L. hysterioides*; *b*, *L. graminis*; *c*, *L. graminicola*; spores, all $\times 600$.

A collective species, undoubtedly; recorded abroad on many other plants, e.g. *Bupleurum*, *Chondrilla*, *Cynanchum*, *Cytisus*, *Dianthus*, *Paeonia*, *Peucedanum*, etc. The pycnidial stage of *Lophodermium Paeoniae* Rehm and its allies. See also *Hypoderma Vincetoxici* (Duby) Schröt. It is a disputed point, whether Saccardo's *hysterioides* is the same as that of Fries.

Fr. Germ. Ital. Swed. Finland, Siberia.

Gramineae

Leptostromella graminicola Grove. *L. hysterioides* var. *graminicola* de Not. Micr. Ital. iii, f. 6. Sacc. Syll. iii. 659. All. vii. 389. Died. 730.

Pycnidia scattered, subepidermal, oblong-lanceolate, obtuse, black, opaque, up to 800μ long, depressed, sulcate, readily seceding. Spores slender, tapering at one or both ends, faintly curved at times, hyaline or nearly so, but pale-olivaceous in mass, $14–18 \times 2\mu$, even 25μ or more long; sporophores short. (Fig. 89*c*.)

On *Phragmites*, Landulph, Cornwall (Hurst). On dead or dying culms of Grasses, Harborne, Birmingham. Apr.

The pycnidial stage of *Lophodermium arundinaceum* Chev. in company with which it is found. The peridium, under the microscope, is reddish-brown.

Germ. Ital. Swed. Siberia.

Leptostromella septorioides Sacc. & Roum. in Mich. ii. 632; Syll. iii. 660. All. vii. 390. Died. p. 730, p. 718, f. 10. Mig. 500.

Pycnidia amphigenous, parallel, immersed in the thickness of the leaf, oblong, erumpent, $300–600\mu$ long, black, opaque, carbonaceous, opening by a slit. Spores filiform, gently

curved, 40–60 × 0·6–1 μ, continuous, hyaline; sporophores filiform, fasciculate, about half as long as the spore.

On dead leaves of Grasses, e.g. *Sieglingia* (= *Triodia*), *Triticum*, etc. Pont-y-Waen and Taf Fawr, Brecon; Budleigh Salterton, Devon (Rhodes). Mar.–Jul.

Possibly the pycnidium of *Lophodermium Robergei* Desm.

Diedicke says that the upper wall is brown and occupies the epidermal cells, while the lower part which penetrates right through the mesophyll is hyaline. The Budleigh Salterton specimens exactly agree with the description of the pycnidium and spores, but the others are rather different. It is a dubious species.

Ardennes, Spain (on *Corynephorus*).

Leptostromella graminis, sp. nov.

Pycnidia narrow-lanceolate or linear, up to 750 μ long, more or less seriate, innate, shining, black, not easily seceding. Spores numerous, filiform, straight or more often curvulous or even arcuate, minutely guttulate, not tapering at the ends or scarcely so at the lower end, 12–18 × 0·5–0·75 μ, hyaline or nearly so, seated on short ovoid cells which arise from a pale-olivaceous or dark-brown stratum. (Fig. 89 *b*.)

On the green part of the dying leaves of Grasses. Pembroke (Rhodes). Bidston (Travis). On leaves of *Poa*, Tintagel, Cornw.; Warwickshire, etc.

The pycnidial stage of *Phyllachora graminis* Fckl., which occurs with it, generally on the more discoloured parts of the leaves.

Juncus

Leptostromella juncina Sacc. in Mich. ii. 352; Syll. iii. 660. All. vii. 390. Died. 730. Mig. 501. *Leptostroma juncinum* Fr. Syst. Myc. ii. 598. Cooke, Handb. 407, 806.

Pycnidia flat, roundish, aggregated, shield-shaped, mouthless, black, shining, sometimes marked with an indistinct groove (?). Spores cylindrical, ± curved, obtuse at both ends, faintly pluriguttulate, 20–30 × 2–3 μ; "sporophores very short, rather thick".

Recorded on dead stems of *Juncus* (*articulatus*, *conglomeratus*, *effusus*, *glaucus*). England, Scotland; common, but usually imperfect.

The pycnidial stage of *Scirrhia Junci* Rehm (not *Dothidea Junci* Cooke, Handb. 806).

A doubtful species; nearly all the specimens I have seen were barren, or were merely the beginnings of the *Scirrhia*, before it had begun to produce its spores. Not to be confused with *Leptostroma Juncacearum*, *q.v.* p. 183.

Fr. Germ. Denm. Swed. Port. Ital. Spain.

Polypodium

Leptostromella Polypodii Grove, in Journ. Bot. 1922, p. 144.

Pycnidia narrow, linear, straight, more or less in rows, up to 500μ long, 50μ broad, but often confluent, black, opening by a fissure; texture in the upper part of loose mealy roundish cells, incomplete below. Spores linear, curvulous, indistinctly guttulate, nearly hyaline, $17–25 \times 1\mu$; sporophores short, finger-shaped, about $5 \times 1{\cdot}25\mu$.

On petioles of leaves of *Polypodium Phegopteris*, in company with *Septoria Polypodii*. Glen Falloch, Perthshire (Boyd). May.

The spores of the *Septoria* and the *Leptostromella* are very similar, but the pycnidia are widely different.

Pteridium

Leptostromella pteridina Sacc. & Roum. in Mich. ii. 353; Syll. iii. 660. T.B.M.S. vi. 51. Grove, in Journ. Bot. 1922, pp. 143–4, pl. 563, f. 10. *L. aquilina* Massal. Sacc. Syll. x. 431. All. vii. 391 (an immature state).

Pycnidia elongated parallel to the petiole, oval-lanceolate, flattened, about $1{\cdot}5 \times 0{\cdot}5$ mm., at first covered by the cuticle, at length tending to be nearly superficial, greyish-black, not sulcate. Spores filiform-acicular, curved, bent, or flexuose, tapering toward the ends, minutely guttulate or faintly 4–6-septate, 50–80 (or even 90) $\times 1{\cdot}5–2\mu$; sporophores short, slender.

On petioles of *Pteridium aquilinum*. West Kilbride and Dalry, Ayrshire (Boyd). Shere (Cooke). Brecon; Bromyard Downs, Herefordshire (Rhodes). May–Jul.

All these specimens and Trabut's Algerian ones were intimately associated with *Didymella Hyphenis* Sacc. (Cooke, Handb. 895), with asci and sporophores arising from the same proliferous stratum. See Journ. Bot. *l.c.* The Leptostromella can be distinguished from *Septoria aquilina* Pass. (Sacc. Syll. iii. 576), which occurs with it abroad, by its much narrower spores (not 3–4μ, as in that species).

Germ. Ital. Spain, Algeria.

PIROSTOMA Fr. Summ. Veg. Sc. p. 395 (emend.).

Pycnidia scutiform, roundish or oblong, thick-walled, pierced by a pore, at length seceding. Spores fusoid or ellipsoid, continuous, olivaceous or greenish.

Resembling Leptothyrium, except for its coloured spores.

Phormium

Pirostoma viridisporum Grove, in Kew Bull. 1921, p. 147, f. 6 *b*, and in Journ. Bot. 1932, p. 2, pl. 599, f. 8. *Phoma viridispora* Cooke in Herb. Kew. Sacc. Syll. iii. 165.

Pycnidia amphigenous, round or (when mature) oblong, up to 1 mm. wide, ± aggregated, sometimes in long series, inky-black, raised in the centre and opening by a large torn pore, at length seceding; texture of loose round dark cells which are not compacted into a pseudoparenchyma. Spores fusoid-lanceolate, acute at both ends, greenish-olive, often with two (or more) guttules, $9–12 \times 2{\cdot}5–3\mu$; sporophores linear, as long as the spore. (Fig. 90.)

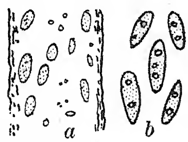

Fig. 90. *Pirostoma viridisporum*: *a*, portion of leaf of *Phormium*, showing habit of the fungus; ×3; *b*, spores, ×600.

On dry dead leaves of *Phormium tenax*. Hunterston, Ayrshire (Boyd). The Lizard; Petit Bot, Guernsey (Rhodes). Polperro, St Ives, and Lelant, etc., Cornwall. Spring and summer.

In company with *Physalospora Phormii* Schröt., exactly as it occurs in its native land; evidently introduced with the host-plant. New Zealand.

Pycnothyrieae

Hymenium inverted, attached beneath the shield.

PYCNOTHYRIUM Died. in Ann. Myc. 1913, xi. 175.

Pycnidium of radiating texture, opening by a pore. Hymenium inverted; spores borne on the underside of the shield-like pycnidium, hyaline, continuous, rather short, not in chains, seated on a hyaline stratum of swollen sporophores.

Gentiana

Pycnothyrium gentianicola Grove, in Journ. Bot. 1922, p. 143. *Leptothyrium gentianaecolum* Bäuml. Myk. Not. p. 1. Sacc. Syll. x. 415. All. vii. 333. Mig. 436. Cf. *Depazea gentianaecola* Fr. Syst. Myc. ii. 531. Sacc. Syll. iii. 62.

Spots roundish or irregular, grey, then brown, unbordered. Pycnidia amphigenous, round, flat, shining, black, subcuticular, then erumpent, 80–100μ diam.; texture minutely parenchymatous. Spore linear-elongate, rounded at both ends, straight or curvulous, 12–15 × 2·5–3μ. (Fig. 91 *d*.)

On dying leaves of *Gentiana acaulis*. Saltcoats, Ayrshire (Boyd).

The spores are linear, and are seated on short papilliform sporophores which spring from the underside of the shield. Bubák, in Ann. Mycol. 1909, vii. 61, describes a very similar fungus on the same host, with spores pale-olive, 13–22 × 2·5–3μ, as var. *olivaceum*.

Austr.

Juncus

Pycnothyrium Junci, sp. nov.

Pycnidia scattered or in short rows, inverted, scutiform, flat, roundish, 200–300μ diam., black, opaque, mouthless; wall of a single layer of branched, dense, radiately arranged cells, which are about 2μ wide, linear, dark-olivaceous, but not opaque; the margin is undulated but not fimbriated, and the whole pycnidium separates easily from the matrix without leaving any mark or scar, except a faint dusky shadowy outline. Spores linear, obtuse at both ends, nearly straight, faintly microguttulate, hyaline, 6–8 × 1–1·5μ; no sporophores seen.

On dead culms of *Juncus communis*. Ayrshire (Boyd). Near Nant-ddu, Brecon; Toward, Argyllshire. Apr.–Aug.

The central cells of the shield are often darker and more cuboidal than the others. Evidently the pycnidial stage of one of the Microthyriaceae. Cf. Died. p. 718, f. 13 *a*, but not 13 *b*, which is incorrect.

Pteridium

Pycnothyrium litigiosum Died. in Ann. Mycol. 1913, xi. 175; Pilz. Brand. p. 731. Mig. 502. *Leptostroma litigiosum* Desm. in Ann. Sci. Nat. 1843, xix. 338. Cooke, Handb. 417. *Leptothyrium litigiosum* Sacc. in Mich. ii. 113; Syll. iii. 636. All. vii. 339.

Pycnidia scattered or gregarious, roundish, flat, 90–100μ

diam., blackish-brown, subopaque, rugged, at length collapsing and opening by an obscure central pore; wall of one outer layer of distinctly radiating smoky-olive cells, but within of colourless cells, the whole shield at length seceding altogether. Spores sausage-shaped, 4–5 × 0·7–1 μ, on short straight stout sporophores which arise from the underside of the central part of the shield. (Fig. 91 *a*, *b*, *c*.)

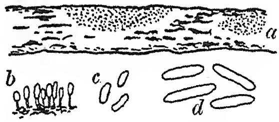

Fig. 91. *Pycnothyrium*: *a*, stipe of *Pteridium*, bearing *Pycnoth. litigiosum* as well as *Leptostroma filicinum* (the longitudinal streaks); *b*, young spores of *P. litigiosum*; *c*, spores of the same, × 600; *d*, spores of *P. gentianicola*, × 600.

On dead petioles ("stipes") of *Pteridium aquilinum*. Not uncommon: England, Wales, Scotland as far north as Dundee. Winter.

Distinguished from *Leptothyrium vulgare* (which it resembles) by its smaller, less black, and almost opaque pycnidia; it is much smaller, rounder, and more crowded than *Leptostroma filicinum*.

The pycnidial stage of *Microthyrium litigiosum* Sacc. Saccardo at first stated (Syll. ii. 648) that it belonged to *Rhopographus filicinus*. Von Höhnel says (Ann. Myc. 1918, xvi. 170) that it is an Ascomycete which he names *Dothithyrella litigiosa* (*l.c.* p. 171); he asserts that he finds asci, but no "stylospores", and that Diedicke's spores grow on the upper outside of the stroma. But our British specimens contain abundant pycnospores, as described above.

Forma **Aspidii**. Pycnidia thinly scattered. On *Aspidium filix-mas*, Brecknockshire.

All South-western Europe, Canada, U.S.A.

THYRIOSTROMA Died. in Ann. Mycol. 1913, xi. 176.

Pycnidium inverted, shield-shaped, opening by a fissure. Spores continuous, seated on palisade-like swollen sporophores on the underside of the shield.

A species (*Th. Hariotii* Fragoso) is recorded from Spain, on *Arrhenatherum elatius*.

Pteridium

Thyriostroma Pteridis Died. in Ann. Mycol. xi. 176; Pilz. Brand. p. 732, p. 718, f. 14. Mig. 502. *Leptostroma Pteridis* Ehrenb. Sylv. Myc. 27. Sacc. Syll. iii. 645. All. vii. 360.

Pycnidia elongated, often confluent in large spots, covered

only by the very thin cuticle; underside of the shield bearing a hyaline layer of rodlike, parallel, mucous sporophores 3–4μ long. "Spores mucoid, round, 1–2μ diam." (Died.).

On dry petioles and leaves of *Pteridium aquilinum*. Glamorganshire (Rees). No British locality for spores known. Spring.

This is very different from *Leptostroma filicinum*, for it is composed of a crowd of small oblong pycnidia-rudiments, forming oblong patches. No one but Diedicke seems to have found "spores"; he says the shield is composed of indistinct flexuose dark-brown cells.

Fr. Belg. Germ. Austr. Ital.

Spiraea

Thyriostroma Spiraeae Died. *l.c.*; Pilz. Brand. 732. Mig. 503. *Leptostroma Spiraeae* Fr. Syst. Myc. ii. 599. Cooke, Handb. 417. Sacc. Syll. iii. 646. All. vii. 356.

Pycnidia variable, conglomerate and connate, shapeless, longitudinally rugose, black, shining, minute, grey within, somewhat resembling a *Hysterium*, at length wholly seceding; texture thin, brittle. Spores curved or falcate, acute at both ends, "with a few guttules", 5–6 × 0·75–1μ.

On dead stems of *Spiraea ariaefolia*, *S. Ulmaria*. Rather common: Sussex; Warwickshire; Worcestershire; Cheshire; Yorkshire; Norfolk; Cornwall; Brecknockshire; Scotland; etc. Jan.–May.

The shield-like pycnidia, on separating, leave pale-brownish marks; Diedicke says they are supported in the middle by a columella. The shield is composed of brownish isodiametric cells, 3–4μ diam., sometimes obscurely radiating at the margin, and is covered only by the structureless cuticle. The spores are rarely to be found, only an oily subsclerotial mass of cells.

Holl. Germ. Swed. Kamtchatka, U.S.A.

ACTINOTHYRIUM Kunze, Myk. Heft. ii. 81.

Pycnidia dimidiate, shield-shaped, readily separating, hardly or not at all dehiscent, membranaceous, black, with a remarkably radiato-fimbriate margin. Spores long, filiform, straight or sometimes curved, hyaline.

The pycnidium is shaped like a flat limpet shell, and is easily separable from the matrix. It is of a radiating, in-

distinctly parenchymatous structure, and is fringed all round the margin with short projecting septate hyphae.

Gramineae

Actinothyrium graminis Kunze, Myk. Heft. ii. 81, pl. 2, f. 3. Greville, Scot. Cr. Flor. pl. 218. Corda, Ic. iii. 20, pl. 4, f. 57. Cooke, Handb. p. 424, f. 151. Sacc. Syll. iii. 658. All. vii. 386, with fig. Died. p. 734, p. 718, f. 16. Mig. p. 500, pl. 65, f. 6–9 (bad).

Pycnidia scattered or gregarious, subcuticular, 200–500 μ diam., scutiform, flat, roundish, slightly umbonate in the centre, dull-black, rugged with a conspicuously radiato-fimbriate margin, bearing the spores on its under side. Spores acicular-filiform, straight or faintly curved, hyaline, 38–60 × 0·75–1 μ, "at length indistinctly 3-septate" (Died.). (Fig. 92.)

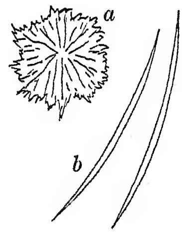

Fig. 92. *Actinothyrium graminis*: *a*, shield-shaped pycnidium, × 30; *b*, spores, × 600.

On dry dead leaves and culms of various Grasses, especially of *Molinia*, but also of *Aira*, *Holcus*, *Phalaris*, etc. England, Scotland, Ireland.

Spring and summer.

The spores are similar to those of Libertella, but are straighter, longer, and slenderer than most of that genus. This fungus can most easily be found by searching the leaves and culms of *Molinia* left over from the previous year.

Fr. Belg. Germ. Denm. Ital. U.S.A.

ADDENDUM

SACIDIUM Nees, *apud* Kunze u. Schm. Myk. Heft. ii. 64; emend. Sacc. Syll. iii. 649.

"Pycnidia dimidiate, clypeate, mouthless, black, membranaceous, with a wall which is textureless, punctulate, and not truly composed of cells. Spores globular or ellipsoid, hyaline or faintly coloured" (Sacc. *l.c.*).

The genus Sacidium should be abolished. It is impossible for a Coelomycete to have a pycnidium with a wall "*anhistus, punctulatus, nec vere cellulosus*"; what has been so called

is the discoloured cuticle of a leaf punctated by the pressure of the fungus-cells crowded beneath it. As Saccardo himself suggested, most of the species that have been placed here are misunderstood Leptothyria.

[**Sacidium Epimedii** Cooke, in Grevill. xv. 110. Sacc. Syll. x. 422. All. vii. 369.

"Pycnidia hypophyllous, scattered, innate, convex, then open above, very delicate. Spores subglobose, hyaline, about 4μ diam.

"On fading leaves of *Epimedium alpinum*. Kew Gardens. Nov."]

Whatever the host-plant here referred to may be, it is not *Epimedium alpinum*, indeed not an *Epimedium* at all; the spores are neither subglobose, nor about 4μ diam. The only spores to be found on the original specimen are lunate (crescentic), faintly granular or sometimes minutely guttulate, $6–7 \times 1–1{\cdot}5\mu$, on short crowded sporophores.

MELANCONIALES

Pustule of spores growing on a proliferous layer, the whole enclosed in a cavity of the plant-tissues, entirely devoid of a proper peridial wall or very nearly so, nestling beneath the cuticle or the epidermis or the periderm, discoid or pulvinate, at length erumpent, often pale in colour, pallid or fuscous or olivaceous or even appearing black when dry. Spores ovoid or oblong, occasionally elongated, at length expelled as tendrils or globules, or if abundant becoming widely effused over the surface. Sporophores often very inconspicuous.

Section I. Spores colourless . . . . HYALOSPERMAE

Section II. Spores coloured . . . . PHAEOSPERMAE, p. 310

HYALOSPERMAE

I. Spores continuous, not more than three or four times longer than broad (HYALOSPORAE).

A. Spores not in chains.

1. Spores ± oblong.

a. Pustules on Phragmidium . . . . . . *Hainesia*

b. Pustules in leaves or other soft parts of plants.

* Spores in a dry cavity . . . . . . *Rhodesia*

** Spores immersed in mucus.

† Hymenium without bristles.

α. Pustules often over stomata . . *Polyspora*

β. Pustules always immersed . . *Gloeosporium*

†† Hymenium with bristles.

α. Bristles not numerous (when young, none) *Colletotrichum*

β. Bristles numerous from the first (essential) *Vermicularia*

c. Pustules in bark of trees or shrubs . *Myxosporium* and *Cryptosporiopsis*

d. Pustules tremelloid . . . . *Achroömyces*

2. Spores allantoid . . . . *Naemospora*

B. Spores in chains.

1. Pustules standing singly, immersed in the host-tissue.

a. Pustules Hysterium-like . . . . *Hypodermium*

b. Pustules roundish, ± confluent.

* Spores globose . . . . . . *Myrioconium*

** Spores cylindric-truncate. . . . . *Blennoria*

2. Pustules embedded in a stroma . . . . . *Trullula*

3. Pustules nearly superficial, spores endoconidial *Bloxamia*

II. Spores with one septum only (HYALODIDYMAE).

A. Pustules seated on radiating fibrils . . . . *Actinonema*

B. Pustules not seated on definite fibrils.

1. Pustules mostly parasitic and on leaves; spores ± oblong.

a. Spores slightly or not at all beaked . . *Marssonina*

b. Spores strongly beaked . . . . *Rhynchosporium*

2. Mostly saprophytic and on branches; spores ± fusoid *Septomyxa*

III. Spores ± oblong, with one or more septa (HYALOPHRAGMIAE).

A. Spores single.

1. Spores with appendages or with elongated ends *Pseudodiscosia* and *Pestalozzina*

2. Spores without appendages . . . . . *Septogloeum*

B. Spores in clusters . . . . *Psammina*

IV. Spores elongated, filiform or fusoid (SCOLECOSPORAE).

A. Parasitic; usually on living leaves . . *Cylindrosporium*

B. Saprophytic; living in bark.

1. Hymenium not flat; spores cylindric or fusoid, rather broad; spore-mass whitish . . . *Cryptosporium*

2. Hymenium flat or grooved; spores filiform, narrow, curvulous; spore-mass yellow or reddish . . *Libertella*

HAINESIA Ell. & Sacc. Syll. iii. 698.

Pustules immersed, but soon erumpent, minute, pulvinate, bright-coloured, most often reddish or yellow, growing on leaves. Spores oblong-ellipsoid, suballantoid, or fusoid, continuous, hyaline, produced at the apex or side of filiform fasciculate sometimes branched pedicels.

This genus (in the species here recorded) corresponds in habit to Darluca among the Sphaeropsidales, but is dis-

tinguished from it by the total absence of a peridium and by its unicellular spores. In fact *Hainesia Rubi* stands to the genus Gloeosporium exactly as *Darluca Filum* does to the genus Ascochyta; the gelatinous periplasm which makes the mucous appendages of Darluca corresponds to the abundant gelatine which surrounds the spores of the Hainesia.

Rubus

Hainesia Rubi Sacc. Syll. iii. 699. *Gloeosporium* (?) *Rubi* Westd. Exs. no. 980. Sacc. Fung. Ital. pl. 1024. *Tremella foliicola* Fckl. Symb. Myc. 402.

Pustules immersed, then erumpent, usually hypophyllous, tremelloid, yellowish, 100–280μ diam., at length faintly tinged with brown, sometimes swelling up, at others collapsing. Spores ellipsoid-oblong or slightly fusoid, colourless, faintly and irregularly guttulate, rounded or somewhat tapering at each end, 6–10 $\times$ 2–3·5μ, surrounded by mucus; sporophores linear or filiform, fasciculate, flexuous, obtuse or acute, colourless, 1·5–2·5μ wide and four or five (or more) times longer than the spore. (Fig. 93.)

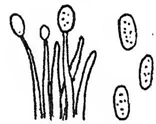
Fig. 93. *Hainesia Rubi*: spores and sporophores, $\times$ 600.

On leaves of *Rubus rusticanus*, associated and often confluent with the sori of *Phragmidium violaceum*. Solva, etc., Pembrokeshire, Aug. 1935. On my informing Mr Rilstone of my discovery he also found it in Cornwall, in September, a few days later.

These pustules are parasitic on the uredosori (less often on the teleutosori) of the Phragmidium, the two kinds of spores becoming thereby intermixed. They appear to start on the sorus while it is still young, and cover its surface with a gelatinous mass which at times can swell up considerably; when the uredospores gain the upper hand the pustule becomes darker in colour. The "Tremella" of Fuckel (*l.c.*) does not exactly agree with this account, but it seems nevertheless to be the same fungus.

The generic name Hainesia has been much misused; the most sensible thing to do would be to confine it to *H. Rubi* and any similar species. In the absence of a peridium there is little to distinguish them from a Hyphomycete. But whether the fungi placed with *H. Rubi* in the third and other volumes of the Sylloge really belong there is an open question.

Belg. Germ. Ital.

RHODESIA Grove, gen. nov.

Pustules minute, immersed, then emergent by a wide opening. Spores bright-coloured, unicellular, broadly oval or fusoid, on the apex of long fasciculate simple sporophores.

When, in 1932, I placed the following species, as a temporary measure, in Saccardo's genus Hainesia, I had not seen *Hainesia Rubi*; but the finding at Solva in Wales of excellent specimens of that rare fungus in August, 1935, showed the unsuitability of such a juxtaposition, and gave me the eagerly-seized opportunity of dedicating this new genus to the pious memory of my lamented friend, Dr P. G. M. Rhodes, who was the first to find it in this country.

Psamma

Rhodesia subtecta, comb. nov. *Fusarium subtectum* Rob. & Desm. in Ann. Sci. Nat. iii. 358 (1845). Sacc. Syll. iv. 724. Lindau, ix. 544. *Hymenula Psammae* Oud. in Nederl. Kruidk. Arch. ser. 3, i. 532 (1898). Sacc. Syll. xvi. 1094. Lindau, ix. 415. *Hainesia subtecta* Grove, in Journ. Bot. 1932, p. 4.

Pustules scattered, immersed, covered by the epidermis, then opening by a wide pore, at length almost superficial, flatly pulvinate, roundish, up to 250μ (or more) in diameter. Spores broadly oval, acute at both ends, straight, singly colourless, in mass of a pleasant pinkish-red, with two guttules or none, $5–7(–10) \times 2–3\mu$; sporophores fasciculate, linear, nearly straight, simple, obtuse, colourless, about $12–14 \times 2\mu$. (Fig. 94.)

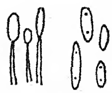

Fig. 94. *Rhodesia subtecta*: spores and sporophores, ×600.

On the outer surface of rolled-in dead leaves of *Psamma arenaria*. Probably common. Merioneth and Pembroke (Rhodes). Cornwall; Norfolk; etc. Jul. Aug.

When quite mature, it is reduced to a little heap of rose-coloured spores lying on the surface of the leaf, and showing no signs of its mode of origin; the mycelium is very scanty.

This species is decidedly not congeneric with *Hainesia Rubi*, but there is no known genus to which it may be assigned. It is certainly not a Fusarium or anything approaching thereto, though it might be considered (yet with difficulty) to be allied to Hymenula. Perhaps, after all, there may be some justification for referring it to the Hyphomycetes (as Saccardo does twice), especially as a similar treat-

ment has now been meted out by some to Bloxamia and Vermicularia and to one of the species formerly classed with Melanconium; undoubtedly, nevertheless, the spores of *Rhodesia subtecta* attain maturity before they emerge from the cavity in which they were formed. The little pink pustules can be seen with a lens shining through the unbroken translucent epidermis on the dead leaves.

Fr. Belg. Holl. Germ.

POLYSPORA Lafferty, in Sci. Proc. Roy. Dubl. Soc. 1921, new ser. xvi. 258.

Pustules minute, gelatinous, hyaline or milky, formed directly over a stoma. Spores continuous, oval, cylindrical or variable in shape, obtuse at both ends, hyaline, growing several or many together at the tip or on the sides of fertile hyphae.

Polyspora Lini Laff. *l.c.*

Spots on the leaves roundish (on the stems elongated, up to 10 mm. or more), brownish, often surrounded by a darker border. "Pustules" of spores convex, densely clustered on the spots, superficial, gelatinous, about 60μ broad, pale reddish-brown. Spores very abundant, oval-oblong or somewhat sausage-shaped, curved, variable, obtuse above, faintly apiculate at the base, singly colourless, granular or minutely guttulate, 10–15(–20) $\times$ 3–4·5μ. (Fig. 95.)

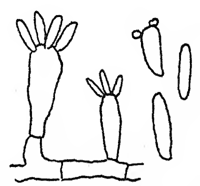

Fig. 95. *Polyspora Lini*: mycelium, with branches bearing immature spores; also loose spores, one pullulating; all $\times$ 600.

On the leaves (including the cotyledons), stems, sepals, fruits and seed of *Linum usitatissimum*. Ireland; appears not to have been reported in England.

The disease is called "Browning" or "Stem-break" of Flax: it occurs more or less every year in Northern Ireland, and can be transmitted by sowing infected seed.

The "pustules" are heaps of spores, produced by the giving off of large numbers from the apex of hyphae which begin by protruding through a stoma and afterwards branch; later the spores are found also in pockets beneath the epidermis. The mycelium is truly hyphomycetous, reminding one of that seen in Fusidomus and Achroömyces.

The spores grow in clusters of variable numbers (3–8 or more) at the apex of short clavate branches of the mycelium or along the mycelial hypha itself. Polyspora is therefore one of those genera which in a way simulate the Coelomycetes, but must be excluded from them; it perhaps approaches nearest to Rhodesia of all the genera included in this work. I am indebted to Mr A. E. Muskett of Belfast for some of these details.

GLOEOSPORIUM Desm. & Mont. in Ann. Sci. Nat. 1849, p. 295 (emend. Sacc.).

Pustules nestling in living leaves, young shoots, twigs, and fruits, at first covered by the epidermis, then erumpent, discoid or pulvinate, glabrous, of various colours, but usually pale. Spores ovoid or oblong, seldom elongated, continuous,

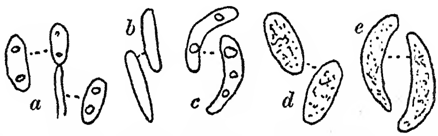

Fig. 96. *Gloeosporium*: *a*, *G. quercinum*; *b*, *G. cylindrospermum*; *c*, *G. Diervillae*; *d*, *G. pachybasium*; *e*, *G. curvatum*, from a Scottish specimen; spores, all ×600.

hyaline, at length expelled in tendrils or rounded masses; sporophores oblong, linear, or acicular, occasionally nodulose, densely packed together, but most often short and inconspicuous.

These fungi often cause spots resembling those of Phyllosticta. Myxosporium differs in growing chiefly on bark of branches of trees, and in not being so markedly parasitic.

The genus serves as a pycnidial stage both of Discomycetes, e.g. *G. phacidiellum*, *G. paradoxum*, and *G. phaeosorum*, and of Pyrenomycetes. Von Höhnel (Fragm. Myk. 1916, no. 981) has separated off certain species under group-names, such as Gloeosporidium, etc., but his groups seem to have no classificatory value. Potebnia (in Ann. Mycol. 1910, viii. 74 ff.) pointed out that there are at least three distinguishable groups of species: one having relationship with Gnomonieae, e.g. *G. nervisequum*, *G. Carpini*, *G. Robergei*, *G. quercinum*; a second, which when older becomes (? always) a Colletotrichum and is connected with Glomerella, e.g. *G. fructigenum* (cf. also *G. affine* and *Colletotrichum cinctum*, p. 230); and a third which belongs to Pseudopeziza, e.g. *G. Ribis* and *G. Salicis*. Further study

will bring to light other subdivisions, e.g. *G. inconspicuum* (*q.v.*, p. 227) is an early stage of a Mycosphaerella, and von Höhnel truly states (*l.c.*) that *G. acerinum* Westd. and *G. acericolum* (Desm.) are merely impoverished (starved) forms of *Phleospora Aceris* Sacc. (for which see Vol. I, p. 432) which = *Septoria Aceris* B. & Br. This genus rarely infects Monocotyledons.

Plurivorous

Gloeosporium affine Sacc. in Mich. i. 129; Syll. iii. 709; Fung. Ital. pl. 1053. Grevill. xix. 42. All. vii. 479, with fig. Died. 777. Mig. p. 531, pl. 70, f. 10–13. Massee, Dis. Cult. Pl. 441.

Spots variable in form and size, whitish when dry. Pustules mostly epiphyllous, scattered, at first concealed by the blackened epidermis. Spores cylindric-oblong, rounded at both ends, 14–20 × 4–6μ, issuing forth in tendrils; sporophores filiform, short.

On leaves of *Hoya* and *Aeschynanthus*, in hot-houses, Glasgow (Boyd). Introduced from Central America into Botanic Gardens, etc., with the plants.

The same name has been given to forms on *Agave*, *Caladium*, and *Sassafras*, as well as to those on *Vanilla* and other orchids. The latter is also called *G. Vanillae* Cooke. Stoneman describes *Gnomoniopsis Vanillae* Stonem., with which was associated a *Colletotrichum*, on leaves, stems, and aerial roots of *Vanilla* (Bot. Gaz. 1898, xxvi. 114).

Germ. Ital. Mexico.

Gloeosporium laeticolor Berk. in Gard. Chron. 1859, p. 604. Cooke, Handb. 474. Sacc. Syll. iii. 718. All. vii. 487. Massee, Dis. Cult. Pl. 440. Duggar, Fung. Dis. Pl. 335.

Spots depressed, whitish in the centre, with a black margin. Pustules circinate. Spores oblong, 16–17μ long, with the protoplasm retracted at each end, issuing in pinkish tendrils.

On almost ripe fruits of *Prunus Persica* (Peach and Nectarine). King's Cliffe (Berk.). Also reported on Melon and Cucumber, and on Grapes (Gard. Chron. 1898, xxiv. 53). Said by Massee to extend from the Peach to the Peach-shoots.

"At first appearing as dark specks with a bleached centre; at length the white spot and the dark ring become more clearly defined, seated in the centre of a regular circular depression the borders of which are pale. The whole surface of the depression was studded with little salmon-coloured warts, disposed more or less in circles" (Berk.).

According to Southworth (Journ. Mycol. vi. 164) *G. fructigenum*, *G. laeticolor*, *G. versicolor*, and *Ascochyta rufo-maculans* are all the same species. *G. orbiculare*, however, must be different.

Europe, N. America, Australia.

Gloeosporium rufo-maculans Thüm. Fung. Pomicol. p. 61, pl. 2, f. 16 (1879). *Septoria rufo-maculans* Berk. in Gard. Chron. 1854, p. 676, with fig. *Ascochyta rufo-maculans* Berk. Outl. p. 320. Cooke, Handb. 456. Sacc. Syll. iii. 395. *Gloeosporium fructigenum* Berk. in Gard. Chron. 1856, p. 245, with fig. Sacc. Syll. iii. 718. *G. laeticolor* Berk. in Gard. Chron. 1859, pp. 603–4; 1890, viii. p. 657. f. 125. Sacc. iii. 718. *G. versicolor* Berk. & Curt. in Grevill. iii. 13 (1874). Sacc. *ibid.* See Vol. I, p. 320, and Stevena, Fung. Pl. Dis. 264–8.

Pustules dingy rose-red, arranged concentrically on the brown depressed parts of the fruits. Spores oblong or sub-cylindrical, often slightly curved, granular within, 20–30 $\times 5$–6μ, issuing in pinkish tendrils; sporophores simple or rarely forked.

On Grapes (*Vitis*) and on the bark and fruits of *Pyrus Malus*, less often of *P. communis*. Not common. Kent; Somerset; Gloucester; etc.

Said to be the pycnidial stage of *Glomerella cingulata* Sp. & Schr. Berkeley gave the range of spore-length as 10–20μ. This fungus is sometimes reported on imported Apples. Perhaps hardly occurring on bark in this country, but it causes a canker in U.S.A. Berkeley believed that it spread, under glass, to Peaches, Nectarines, and Apricots, to which others have added Quinces and Green Figs. See *infra*, p. 221.

Holl. Germ. Denm. Ital. U.S.A. Australia, etc.

Alnus

Gloeosporium cylindrospermum Sacc. Syll. iii. 715; Fung. Ital. pl. 1027. All. vii. 453, with fig. Mig. p. 525, pl. 72, f. 3. *Leptothyrium cylindrospermum* Bon. in Rab. Fung. Eur. no. 678. Fckl. Symb. Myc. 120. *Discosia alnea* Fr. *p.p.* *Gloeosporium alneum* Westd.

Spots epiphyllous, fuscous-chestnut. Pustules punctiform, flattened, black. Spores cylindric-fusoid, straight or gently curved, 10–$15 \times 2{\cdot}5$–3μ. (Fig. 96 *b*, p. 207.)

On living leaves of *Alnus glutinosa*. Eastham Rake, Cheshire (Ellis). Llanbedr, Wales (Rhodes). Nov.

But specimens of *Leptothyrium alneum*, having what look like distinct scutiform rugulose pycnidia, can yield spores of exactly the same shape and size; so that, although the spores of the latter are said by Saccardo to measure "8–$9 \times 1{\cdot}5$–2μ", there is no doubt that

the *Gloeosporium* is only an early stage of the *Leptothyrium* (*q.v.*). In Dr Ellis's specimens the spots are small, numerous, roundish, dark-brown, visible on both sides; the spores are quite straight and cylindrical, with rounded ends, but a few are gently curved, and still fewer taper somewhat at one end. They measure 13–16 × 1·5–2 μ.

In all probability *Gnomoniella tubiformis* Sacc. is the ascophorous stage, being found, on the fallen leaves, on the same discoloured spots on which the pycnidia have grown.

Holl. Germ. Denm. Austr. Ital.

Aristotelia

Gloeosporium Aristoteliae Sm. & Ramsb. in T.B.M.S. 1917, v. 429.

Spots long, narrow, near the edge of the leaf, becoming fuscous, with a purple margin. Pustules numerous, gregarious, amphigenous, black, about 150–170 μ diam. Spores ellipsoid, often narrowed below, 3–6 × 2 μ; sporophores variable, hyaline, then often brownish, about 25 × 5 μ.

On living leaves of *Aristotelia Macqui*. Torquay (Gepp). *n.v.* May.

Berberis

[**Gloeosporium Berberidis** Cooke, in Grevill. xiii. 98. Sacc. Syll. x. 452. All. vii. 458.

"Spots brown, with a bright-red margin. Pustules hypophyllous, numerous, gregarious, convex, pallid, seated on broad discoloured patches of the fading leaves, sometimes occupying the whole surface. Spores ovoid, 5 × 3 μ.

"On leaves of *Berberis asiatica* and other species of *Berberis*. Kew Gardens. Mar. Apr."

On examining the original specimens, it becomes evident that some great error has occurred in connexion with this description. It should probably be deleted, although a parasite on *Berberis* is recorded in U.S.A. under this name.]

Betula

Gloeosporium Betulae Fckl. Symb. Myc. p. 368, pl. 1, f. 32. Sacc. Syll. iii. 714; Fung. Ital. pl. 1028. All. vii. 458, with fig. Died. 767. Mig. p. 526, pl. 69, f. 9, 10. *Leptothyrium Betulae* Lib. Exs. no. 163.

Spots roundish or angular, 1–3 mm. across, olivaceous or blackish-fuscous. Pustules epiphyllous or amphigenous, depressed, black, at length erumpent, tearing the epidermis into 2–4 segments. Spores rod-shaped or somewhat clavate, often

obtuse at the ends, nearly straight, 13–16 × 2 μ, issuing in whitish tendrils; sporophores very short, crowded.

On fading leaves of *Betula alba*. Aberdeen (Trail). Ayrshire, Buteshire, and many other places in Scotland (Boyd). Argyll. Jul.–Aug.

There is no mention of *Gl. Betulae* by Montagne on the page of Ann. Sci. Nat. usually quoted.

Fr. Belg. Holl. Germ. Denm. Ital.

Gloeosporium betulinum Westd. Exs. no. 978. Sacc. Syll. iii. 715. All. vii. 458. Died. 767. Mig. 526.

Spots visible on both sides, roundish, fuscous-brown above, clear-brown below, almost ferruginous, up to 6 mm. diam. Pustules hypophyllous, very small, inconspicuous, densely gregarious, flat, filling the epidermal cells, at length throwing off the upper part. Spores ovoid or oblong, 4–10 × 2–5 μ, at times longer.

On leaves of *Betula alba*. Lady Wood, Besford, Worcestershire (Rhodes). Aug.

It is not certain that this is different from *G. Betulae*.

Fr. Belg. Holl. Germ. Denm. Ital.

Brassica

Gloeosporium concentricum B. & Br. in Ann. Nat. Hist. 1850, v. 455. Cooke, Handb. 474. Sacc. Syll. iii. 701. All. vii. 459. Died. 767. Mig. 527. *Cylindrosporium concentricum* Grev. Scot. Cr. Fl. pl. 27. Thomson, in T.B.M.S. xx. 123, with figs.

Pustules hypophyllous, subcuticular, minute, whitish, arranged concentrically. Spores numerous, shortly cylindrical or sausage-shaped, often biguttulate, truncate at one end or rounded at both, 9–10 × 2–2·5 μ (8·5–15 × 2·5–5·5 μ, Thomson), oozing out to form little white masses; no setae.

On living or even on dead leaves of *Brassica* (e.g. Cabbage, Kale, Cauliflower). Recorded for Kent, Sussex, Hants., Dorset, Devon, Northants., Berks., Yorks., Northumberland, Glamorgan, Edinburgh, etc. Berkeley's specimens examined.

Forms roundish bleached spots on Cabbage leaves; in the early stage these spots consist of numerous minute white dots arranged more or less concentrically. At a later stage the spots often run into each other, and form large dead patches. Greville's species seems not

to be different from Berkeley's. This cannot be the same as *Colletotrichum Brassicae* Sch. & Sacc. (Syll. x. 468), which has black pustules, dusky setae, and fusoid spores 19–24μ long.

Germ. Denm.

Buxus

Gloeosporium pachybasium Sacc. in Mich. ii. 117; Syll. iii. 710; Fung. Ital. pl. 1058. All. vii. 459, with fig. Died. 768. Mig. p. 527, pl. 69, f. 11–15.

Pustules pulvinate, hypophyllous, subepidermal, then becoming somewhat erumpent, 250–300μ diam., roundish or angular, flesh-coloured. Spores oblong-ellipsoid, $14–16 \times 6–8\mu$, pointed below, rounded above, pluriguttulate, hyaline; sporophores thick, obovoid, $15–20 \times 10\mu$. (Fig. 96*d*, p. 207.)

On dead leaves of *Buxus sempervirens*. Mickleham Down (Harvey Bloom). June.

While the pustules and the spores of Mr Bloom's specimen agree well with the description, nothing could be seen of the wonderful subquaternate arrangement of the spores so picturesquely figured by Saccardo.

Fr. Germ. Ital.

Carpinus

Gloeosporium Carpini Desm. in Ann. Sci. Nat. 1853, xx. 214. Cooke, Handb. 909. Sacc. Syll. iii. 712; Fung. Ital. pl. 1021. All. vii. 461, with fig. Died. 768. Mig. p. 528, pl. 70, f. 1–3. *Leptothyrium Carpini* Lib. Exs. no. 256.

Spots brownish above, olivaceous beneath, cloudy, irregular, not bordered. Pustules hypophyllous, crowded, very minute, rugose, fuscous. Spores cylindrical, somewhat curved, $8–10 \times 1\mu$, often acute at the ends.

On living and fading leaves of *Carpinus Betulus*. Hampstead; Highgate Wood (Cooke). Aug. Sept.

Assigned as a pycnidial stage to *Gnomonia fimbriata* Fckl.

I find the size of the spores in Cooke's specimens, as also in Sydow, Mycoth. Germ. no. 1722, to be as given above. Saccardo gives them as $10–15 \times 0·5\mu$, and incorrectly describes them as falcate. *G. Robergei* differs in its ovoid and much broader spores.

Europe, N. Amer.

Gloeosporium Robergei Desm. in Ann. Sci. Nat. 1853, xx. 214. Sacc. Syll. iii. 712; Fung. Ital. pl. 1049. All. vii. 462 with fig. Died. p. 769, p. 770, f. 11. Mig. 528. Grove, in Journ. Bot. 1918, p. 320.

Spots roundish or sinuous, often marginal, pale-umber,

becoming subochraceous in the centre, without a distinct border line, 3–5 mm. across. Pustules hypophyllous, subepidermal, chiefly on the paler part of the spot, rather crowded, 100–125μ diam., blackish, prominent, at length distinctly rugose and surrounded by laciniae. Spores oval or obovoid, rounded at both ends, guttulate and granular within, at last appearing thick-walled, 10–15 × 5–8μ; sporophores short.

On living or fading leaves of *Carpinus Betulus*. Ayrshire (Boyd). Perranzabuloe, Cornw. (Rilstone). Heythrop Park, Oxon. Jul.–Oct.

Said to be the pycnidial stage of *Sphaerognomonia carpinea* (Fr.) Potebn. in Ann. Mycol. viii. 54.

W. Europe, U.S.A.

Citrus

Gloeosporium Aurantiorum Westd. in Bull. Acad. Roy. Belg. 1854, vol. xxi, no. 19. Sacc. Syll. iii. 702. All. vii. 465. *Sphaeropsis Aurantiorum* Rabenh. no. 23, in Marcucci, Unio Itin. Crypt. Exs. (1866). *Phoma Aurantiorum* Sacc. Syll. iii. 83. *G. Hendersonii* B. & Br. in Ann. Nat. Hist. 1878, i. 26. *G. intermedium* Sacc. in Mich. ii. 118 (1880); Fung. Ital. pl. 1043. *G. Hesperidearum* Catt. Micet. Agrum. p. 12. Sacc. Syll. iii. 702; Fung. Ital. pl. 1186. See Grove, in Kew Bull. 1919, p. 196, fig. 19.

No distinct spots on the dry leaves. Pustules mainly hypophyllous, densely scattered over the leaf, roundish, 150–230μ diam., fuscous, surrounded when young by a blackish line, blackish when old, flat, then bullate and erumpent. Spores cylindric-ellipsoid, rounded at both ends, with a faint yellowish tint in mass, often biguttulate, 14–18 × 5–6μ; sporophores about as long.

On dying leaves of *Citrus Aurantium* in a conservatory. Milton, Northants. (Berk.). Berkeley's specimen examined; it is exactly the same as that of Westendorp (Herb. Crypt. Belg. no. 1188).

Fr. Belg. Ital.

Cochlearia

Gloeosporium salsum Grove, in Journ. Bot. 1918, p. 320.

Spots none or indistinct. Pustules amphigenous, scattered, honey-coloured, then blackish, rather prominent, up to 150μ diam. Spores very abundant, oblong-ellipsoid, rounded at

both ends, often biguttulate, occasionally curved, pale-rosy in mass, 3–5 × 1–1·25 μ.

On living leaves of *Cochlearia officinalis*. Ayrshire (Boyd). Oct.

The spores at length ooze out and form little pallid-rosy masses above the opening of the pustule.

Crotalaria

Gloeosporium Crotalariae Massee, in Kew Bull. 1913, p. 198.

Spots amphigenous, determinate, at first roundish, then irregular, brownish, often grey in the centre. Pustules subepidermal, then erumpent, with a rosy tinge. Spores oblong-ellipsoid, rounded at the ends, 25–28 × 7–8 μ; sporophores hyaline.

Parasitic on young shoots of *Crotalaria juncea*. Kew Gardens. *n.v.* No specimen at Kew.

Cucurbitaceae

Gloeosporium orbiculare Berk. & Mart. in Plant. Port. Welw. 1853, p. 7. Sacc. Syll. iii. 720. All. vii. 470. Massee, Dis. Cult. Pl. 439. *Cytospora orbicularis* Berk. in Ann. Nat. Hist. 1838, i. 207, pl. 7, f. 6. *Myxosporium orbiculare* Berk. Outl. 325. Cooke, Handb. 473.

Pustules forming orbicular patches, confluent, with one or two pores in each group. Spores oblong, pale vinous-red, rounded at both ends, 14 × 3–5 μ, issuing in slender tendrils.

On fruits of *Cucurbitaceae*, e.g. Vegetable Marrows, Gourds, and Melons, when nearly ripe. King's Cliffe; Benefield, Northants., etc.

Berkeley (in Ann. Nat. Hist. *l.c.*) represents the spots as orange-brown and surrounded by a distinct paler zone. See Gard. Chron. 1876, ii. 175, 269. This is not a form of *G. laeticolor*.

Port. Denm.

Cytisus

Gloeosporium Cytisi B. & Br. in Ann. Nat. Hist. 1881, vii. 129. Grevill. x. 48. Sacc. Syll. iii. 705. All. vii. 471. Massee, Dis. Cult. Pl. 441.

Spots white or pale-coloured, usually surrounded by a red border. Pustules hypophyllous, minute. Spores ellipsoid-oblong, 6–9 × 3–3·5 μ (7–10 × 2–3 μ).

On leaves of *Laburnum*. Glamis (Rev. J. Stevenson). Bradnock's Marsh, Warwickshire. Aug.

The words "semel v. bis" in Saccardo (*l.c.*) arise from a misconception of the English words in Grevillea.

Daphne

Gloeosporium Mezerei Cooke, in Grevill. xix. 8. Sacc. Syll. x. 454. All. vii. 471.

Pustules epiphyllous, gregarious, sometimes confluent, small, brown with a paler centre. Spores ellipsoid or almost almond-shaped, with one or two or more guttules, $15 \times 6\mu$; sporophores very short.

On fading leaves of *Daphne Mezereum*. Kew Gardens (Cooke), 1890. Surrey (1932). Aug.

Probably a young state of *Marssonina Daphnes*, *q.v.* p. 274. Holl.

Diervilla

Gloeosporium Diervillae Grove, in Journ. Bot. 1922, p. 145.

Spots roundish, 3–4 mm. diam., pallid, then whitish, with a broad reddish border. Pustules epiphyllous, circular, depressed, blackish, up to 125μ diam. Spores oblong, curvulous or arcuate, obtuse at both ends, with two or more guttules, colourless, $15–20 \times 2{\cdot}5–3\mu$. (Fig. 96*c*, p. 207.)

On living leaves of *Diervilla* (*Weigelia*) *florida*. West Kilbride, Ayrshire (Boyd). Sept.

The spores are very similar to those of *G. frigidum* Sacc.

Encephalartos

Gloeosporium Encephalarti Cooke & Mass., in Grevill. xvi. 102. Sacc. Syll. x. 457. All. vii. 472.

Pustules rather large (1–2 mm. long), scattered over the pinnae, immersed, the epidermis elevated and discoloured brown or black, with a pale perforated centre. Spores ellipsoid, $8 \times 5\mu$.

On leaves of *Encephalartos horridus*. Kew Gardens.

Fagus

Gloeosporium Fagi Westd. Not. 7, p. 12 (1853, *non* Fckl.). Sacc. Syll. iii. 713; Fung. Ital. pl. 1022. All. vii. 474, with fig. Died. 773. Mig. p. 530, pl. 70, f. 7–9. *Labrella Fagi* Desm. & Rob. in Ann. Sci. Nat. 1853, xx. 225.

Spots roundish or irregular, appearing brownish on the upper surface, but greenish-olive on the lower. Pustules

hypophyllous, minute, rather prominent, somewhat honey-coloured or fuscous. Spores oblong-ovoid, more rarely rhomboid, with two or three minute guttules, 13–20 × 6–8μ; sporophores cylindrical, fasciculate, about half as long.

On fading leaves of *Fagus silvatica*. Epping Forest; Forth; Clyde; Aberdeen; Ayrshire; etc. Aug. Sept.

Fr. Belg. Holl. Denm. Germ. Austr. Ital.

Fraxinus

Gloeosporium fraxineum Peck, in 35th Rep. N.Y. St. Mus. Bot. 1884, p. 137. Sacc. Syll. x. 452.

Spots numerous, small, pallid-red, with a dark or purple margin, becoming whitish in the centre. Pustules few. Spores oblong-ellipsoid, often biguttulate, 5–6 × 4μ.

On leaflets of *Fraxinus excelsior*. Hampton-in-Arden, Wk. Aug.

My specimens seem to be very similar to Peck's species, but I have not met with it more than once.

U.S.A.

Geum

Gloeosporium Gei Trail, in Scot. Nat. 1885, p. 189. Sacc. Syll. x. 458. All. vii. 477.

Spots brown. Pustules about 200–300μ diam., scattered, opening by a pore. Spores very numerous, fusoid or ellipsoid, acute, straight or slightly curved, sometimes 2-guttulate, 7–9 × 2–2·5μ; sporophores crowded, slender.

On dead stems of *Geum urbanum*. Near Aberdeen (Trail). On *G. rivale*, Ayrshire (Boyd).

Hedera

Gloeosporium Helicis Oud. Fung. Néerl. no. 196. Sacc. Syll. iii. 707; Fung. Ital. pl. 1026. All. vii. 477, with fig. *Cheilaria Helicis* Desm. in Ann. Sci. Nat. 1847, viii. 27.

Spots epiphyllous, 3–5 mm. across, fuscous, scarcely margined, but paler in the centre. Pustules few and epiphyllous, in the centre of each spot, small, lens-shaped, yellowish-brown. Spores oblong-clavate, somewhat bent, the curvature being especially marked at the lower end, granular, 20–22 × 6–7μ.

On leaves of *Hedera Helix*. Ayrshire; Dumbartonshire (Boyd). Gloucestershire. Glamorganshire. Co. Dublin.
Mar.–Sept.

Fr. Holl. Denm.

Gloeosporium paradoxum Fckl. Symb. Myc. 277. Sacc. Syll. iii. 707. All. vii. 478. Died. p. 775, p. 770, f. 7. Mig. 531. *Myxosporium paradoxum* de Not. Micr. Ital. ii. 10. Cooke, Handb. 473. Massee Fung. Fl. iv. 61. *Gloeosporidium paradoxum* Petr. in Ann. Mycol. xx. 14. *Phoma Ralfsii* Sacc. Syll. iii. 113 (probably).

Spots none or indistinct. Pustules amphigenous, discoid, gregarious, amber or orange-brown, covered by the epidermis. Spores ovoid, somewhat truncate at the base, $7–9 \times 3–6\mu$; sporophores fasciculate, cylindrical, stout, $12–15 \times 4–5\mu$.

On leaves of *Hedera Helix*. Penzance; King's Cliffe; Twycross; Tunbridge Wells; Cheshire; Warwickshire; Staffordshire; Wales; Ayrshire; Forth; Tay; Inverness. Not uncommon. Spring and summer.

Frequently in company with its ascophorous stage *Trochila Craterium* Fr., which can be distinguished from it by the much darker colour. It is evolved first in the epidermal cells, then penetrates into the mesophyll, and finally is covered only by the cuticle.

Fr. Belg. Holl. Germ. Austr. Ital. Port. India.

Landolphia

Gloeosporium Landolphiae Henn. in Verh. Bot. Ver. Prov. Brandenb. xxx. 171. Sacc. Syll. xvi. 1001.

Spots marginal, dry, fuscous. Pustules scattered, epiphyllous, erumpent, lenticular, fuscous. Spores cylindric-oblong, obtuse at both ends, straight, granular within, hyaline, $13–15 \times 4–5{\cdot}5\mu$.

On leaves of *Landolphia* (Apocynaceae). Kew Gardens.
Jan.

Germ.

Nymphaea

Gloeosporium Nymphaearum Allesch. in Hedwig. 1895, p. 276. Sacc. Syll. xiv. 1004. *Ascochyta Nymphaeae* Passer. (*sec.* Died. in Ann. Mycol. x. 136).

"Spots amphigenous, subcircular or irregular, often confluent, at first reddish, then darker, at length pale in the centre. Pustules immersed, erumpent, minute. Spores oblong or cylindrical, even clavate or subpyriform, rounded at both

ends, cloudy or eguttulate, continuous, hyaline, very variable, up to 28–30 × 4–6 μ."

On fading leaves of *Nymphaea* and *Nuphar*. Kew Gardens; Hampton Court. Said to be a destructive disease. *n.v.*

Aug. Sept.

Many specimens (? all) so-named are only *Ovularia Nymphaearum* Bres. & All. = *Ramularia Nymphaeae* Bres. (Sacc. Syll. xi. 601) = *Ovulariella Nymphaearum* Kab. & Bub. Exs. no. 585. See Lindau, viii. 241, and All. vi. 511.

Germ. Denm.

Orchidaceae

Gloeosporium Orchidearum Karst. & Har. Journ. Botanique, 1890, p. 360. Sacc. Syll. x. 462.

Pustules amphigenous, concealed by the almost blackened epidermis which at length dehisces by an elongated sometimes flexuous fissure, minute, but of no definite shape. Spores elongate-fusoid, at times inequilateral, straight, 20–25 × 5–7 μ; sporophores very short.

On leaves of Orchids. Botanic Gardens, Dublin. *n.v.*

Cf. *Hypodermium Orchidearum* C. & M., of which this may be merely a form. The species recorded in Britain upon Orchids are very confused, the same thing being placed repeatedly under different names, but at present there is not sufficient evidence to disentangle them. See also *Colletotrichum cinctum* Stonem. *infra*, p. 230.

Mexico.

Gloeosporium Bidgoodii Cooke, in T.B.M.S. 1903, ii. 15. Sacc. Syll. xviii. 457. Massee, Dis. Cult. Pl. 441. Journ. Roy. Hort. Soc. vol. xxvi, pp. cxxxix and cxli.

Pustules rather large, covered by the blackened epidermis, then erumpent; basal stratum blackish. Spores narrowly ellipsoid, biguttulate, 18–20 × 4 μ; sporophores becoming hyaline upwards.

On leaves of cultivated *Odontoglossum*, in hot-houses, London. *n.v.*

Stated to be different from other species on Orchids, especially in the size of the spores, but otherwise resembling them. Cf. *G. affine* Sacc., and also *G. Coelogynes* Syd., *G. Epidendri* Henn., *G. Laeliae* Henn., *G. Oncidii* Oud. etc.

Pelargonium

[**Gloeosporium Pelargonii** Cooke & Mass. in Grevill. xviii. 20. Sacc. Syll. x. 453. All. vii. 487. Massee, Dis. Cult. Pl. 441.

Pustules hypophyllous, scattered, especially near the veins, bullate, pallid. Spores oblong-cylindrical, rounded at each end, $20 \times 4\text{–}5\mu$.

On living leaves of Ivy-leaved *Pelargonium*. Kew Gardens.]

Whatever this may be, it is certainly not a Gloeosporium, nor indeed one of the Melanconiales at all. It is probably no fungus, but a blister due to some physical cause, i.e. an intumescence.

Phillyrea

Gloeosporium phillyreinum Grove. *G. Phillyreae* Grove, in Journ. Bot. 1912, p. 53 (*non* Pass.).

Pustules hypophyllous, 150–250μ diam., scattered or gregarious, black, covered by the blackened epidermis, then erumpent and piercing it with a white pore. Spores ellipsoid, sometimes slightly tapering at the ends, biguttulate, $8\text{–}9 \times 2\text{–}2{\cdot}5\mu$.

On dead leaves of *Phillyrea media*. Studley Castle. Apr.

Platanus

Gloeosporium nervisequum Sacc. in Mich. ii. 381; Syll. iii. 711; Fung. Ital. pl. 1051. All. vii. 490, with fig. Died. 782. Mig. p. 534, pl. 72, f. 1. Southworth, in Journ. Mycol. 1889, v. 51. *Fusarium nervisequum* Fckl. Symb. Myc. p. 369, pl. I, f. 37. *Gloeosporium Platani* Oud. Mat. Myc. Néerl. ii. 29. Sacc. Fung. Ital. pl. 1059. Mig. p. 535, pl. 71, f. 8–11. All. vii. 491, with fig. *Fusarium Platani* Mont. in Ann. Sci. Nat. 1849, xi. 55. *Phoma notha* Berk. in Ann. Nat. Hist. 1850, v. 369. Cooke, Handb. 418. *Fusicoccum veronense* Massal. in Bull. Soc. Bot. Ital. 1900, p. 255.

Spots dry and brown, chiefly following the course of the nerves. Pustules mostly epiphyllous, compact, rather prominent, roundish or oblong, rugulose, erumpent, fuscous, then quite black, often dehiscing longitudinally. Spores oblong-ovoid, occasionally subpyriform, $12\text{–}15 \times 4\text{–}6\mu$; sporophores subulate, $20\text{–}25 \times 2{\cdot}5\text{–}3\mu$, or sometimes shorter.

On living leaves, petioles, and twigs of *Platanus acerifolia*, *P. occidentalis*, *P. orientalis*. Not uncommon: Southern England and the Midlands. Jul.–Oct.

The pycnidial stage of *Gnomonia veneta* Kleb.

Often a destructive parasite causing the leaves to fall prematurely,

but usually, as at Birmingham, it does little if any harm. It produces brown spots which follow the course of the midrib and nerves, cutting off the supply of sap to the parts beyond. The little black dots lying alongside the nerves are very conspicuous. In the United States, where it does much harm, it is known as "Sycamore" Blight. It is doubtful whether it also infests Oak leaves, as suggested by Fuckel, and by Stoneman in Bot. Gazette, 1898, xxiv. 85. Probably it may be an allied species that does so.

The perfect stage, *G. veneta*, occurs on the fallen leaves during the winter and spring. Klebahn, who proved this, also showed that *Discula Platani* Sacc. (=*Myxosporium valsoideum* All.) and *Gloeosporium Platani* Oud. as well as *Sporonema Platani* Bäuml., *Fusicoccum veronense* Massal., and possibly *Cytosporella Platani* Oud., are only other forms or stages of the same fungus. See Jahrb. f. wiss. Bot. 1905, xli. 515, f. 22–39.

Europe, North America, S. America, Australia.

Populus

Gloeosporium Tremulae Pass. in Hedwig. 1874, p. 187. Sacc. Syll. iii. 712. All. vii. 494. Died. 783. Mig. 535. *Leptothyrium Tremulae* Lib. Exs. no. 161.

Spots oblong or roundish, becoming cinereous, bordered by a fuscous line. Pustules amphigenous, scattered, sometimes arranged in circles, resembling pycnidia on account of the blackened epidermis, flat, rugulose, olivaceous-fuscous, at length circumscissile and falling out. Spore between fusoid and sausage-shaped, curvulous, $10–15 \times 1·7–2 \mu$; sporophores filiform, scarcely $5–6 \mu$ long.

On leaves of *Populus Tremula*. No certain British locality known.

Europe generally.

Prunus

Gloeosporium phacidiellum Grove, in Journ. Bot. 1912, p. 53; *ibid.* 1933, p. 288.

Spots suborbicular, 0·5–1·5 cm. diam., whitish, bordered by a narrow brown margin. Pustules epiphyllous, numerous, minute, pale-brown, translucent, covered, then crowned by the laciniae of the epidermis which is split into three or four segments after the fashion of a Phacidium. Spores oblong, obtuse, granular, almost colourless, $18–20 \times 7–8 \mu$ (about $15 \times 5 \mu$, Gregor); sporophores thick, $40 \times 6–7 \mu$.

On living leaves of *Prunus Laurocerasus*. Studley Castle. March.

The pycnidial stage of *Trochila Laurocerasi* Fr. A proof of this connexion is given in a paper by Dr Mary J. F. Gregor, in Ann. Appl. Biol. 1936, xxiii. 700–4, pl. 31; cf. *G. paradoxum*, on Ivy. *Ceuthospora Laurocerasi* Grove, for which see Vol. I, p. 291, may be part of the life-cycle of the same *Trochila Laurocerasi*.

Pyrus

Gloeosporium album Osterw. Centralbl. f. Bakt. 1907, II, xviii. 825. Mig. 534. See T.B.M.S. 1924, x. 107, and Marchal, in Bull. Soc. Roy. Belg. 1921, liv. 126, pl. 2, f. 4.

Pustules whitish, concentrically arranged, 90–830μ broad. Spores colourless, cylindrical, somewhat bent, rounded at both ends, about $24 \times 3\mu$; sporophores variable in length, but mostly short, sometimes branched at the base.

On fruits of *Pyrus communis*, *P. Malus*, *P. Cydonia*. Devon; Reading; Hertfordshire; Lancashire; etc.

The spores tend to be sickle-shaped, and are longer and narrower than the almost straight spores of *G. fructigenum*.

Germ.

Gloeosporium fructigenum Berk. in Gard. Chron. 1856, p. 245, fig. Cooke, Handb. p. 474, f. 185. Sacc. Syll. iii. 718; Fung. Ital. pl. 1042. All. vii. 492, with fig. Died. 781. *G. versicolor* B. & C. North Amer. Fungi, no. 503! *G. rufo-maculans* Thüm. *p.p.* See Journ. Mycol. vi. 164, and Duggar, p. 271, f. 122–4.

Pustules concentrically arranged, somewhat pulvinate, dingy rose-coloured, erumpent by a pore which is often torn. Spores cylindric-oblong, usually straight, granular within, $20–30 \times 5–7\mu$, issuing forth as pinkish tendrils or globules; sporophores simple, rarely forked, continuous, about as long as the spore.

On decaying fruit of *Pyrus* (Apples and Pears). Woodnewton; Worcestershire; Perth; Leinster, etc.

"Studding the fruit with pearl-like specks, bursting through the cuticle, and swelling above it in the form of little flat cushions. Sometimes single, often surrounded by a more or less perfect ring" (Berk.).

This fungus, which later becomes a *Colletotrichum*, has an ascophorous stage which has been variously called:

Gnomoniopsis fructigena Clinton, Illinois Exper. Sta. Bull. no. 69 (1902).

Glomerella rufo-maculans Sp. & von Schr. (1903).

Glomerella fructigena Sacc. Syll. xvii. 573 (1905).

It has been called the "Bitter-Rot of Apples"; the "Ripe Rot of Grapes" and the "Anthracnose of Sweet Peas" have also been attributed to it. But it is not certain that these three diseases are all caused by the same species of fungus. The following references should be consulted: Gard. Chron. 1913, liv. 24; Science, xvii. 188; Bull. Illin. Expt. Sta. Urb. 1902, p. 211, plates A–J; Journ. Mycol. 1891, vi. 164; Bot. Gaz. 1898, xxvi. 71; *ibid.* 1907, xliii. 261. More culture work has perhaps been done on this species than on any other; as a result Stevens (p. 267) says that *G. fructigenum* on Apple = *G. elasticae* on *Ficus* = *Colletotrichum Lindemuthianum* on Bean = *Ascochyta rufo-maculans* on Grape: to these may be added *G. laeticolor* Berk. on Peach and Nectarine, and it is also recorded on Melon and Cucumber fruits, on green Figs, and on Quinces. Very rarely short bristles have been found in the pustules, and also 1-septate spores.

In this book the various forms are, for convenience, separately described.

Davis, in Mycologia, 1931, xxiii. 159–178, describes this fungus on *Symphoricarpus*, and states that he conveyed the infection, by spores, from the *Symphoricarpus* to Apple, Pear, Quince, Tomato, Grape, etc. See *Ascochyta rufo-maculans* in Vol. I, p. 320, for Berkeley's original record.

Europe, N. America, etc.

Gloeosporium malicorticis Cordley, Bull. Oreg. Agric. Expt. Sta. 1900; Bot. Gaz. 1900, p. 57. Stevens, p. 542, figs. 338, 367. Sacc. Syll. xvi. 998. *Cryptosporiopsis malicorticis* Nannf. Studien, p. 91.

"Spots brownish, slightly depressed, irregular in outline. Pustules minute, erumpent. Spores elliptic, curved, hyaline or greenish-tinged, granular, $24 \times 6\mu$."

On stems of *Pyrus Malus*, and (?) of *P. communis*. Not known with certainty as British.

It is quite possible that it is only a state of *Myxosporium corticola* Edg. (*q.v.*), but this is not proved. See Potebnis in Ann. Mycol. v. 207. It may even probably be nothing but a young Diplodia.

U.S.A.

Quercus

Gloeosporium quercinum Westd. Exs. no. 981. Kickx, Flor. Cr. Flandr. ii. 95. *G. umbrinellum* B. & Br. in Ann. Nat. Hist. 1866, xviii. 121, pl. 3, f. 5. Cooke, Handb. 475. Sacc. Syll. iii. 714. All. vii. 496. Died. 785. Mig. 536.

Spots irregular or angular, 2–15 mm. across, fuscous, with a brown margin. Pustules amphigenous, roundish, flat, brown, up to 250μ diam. Spores oblong-fusoid, usually biguttulate or somewhat cloudy, $10–15 \times 3–5\mu$, issuing at

length in pale irregular tendrils; sporophores oblong, as long as or slightly longer than the spore. (Fig. 96*a*, p. 207.)

On living and fallen leaves of *Quercus Robur*. Batheaston; Surrey; Oxford; Worcestershire; Hereford; Ayrshire; Clyde; Aberdeen; Aviemore; etc. Aug.–Oct.

Said to be the pycnidial stage of "*Gnomonia quercina*".

The spores of Westendorp's *G. quercinum* are wrongly said by Saccardo (*l.c.*) to measure 5–6 × 2·5 μ but in Westendorp's original description the size is given as 10–12·5 × 5 μ.

Fr. Belg. Germ. Denm. Austr. Switz. Albania.

Rhododendron

Gloeosporium Rhododendri Briosi & Cav. Fung. Paras. no. 198. Sacc. Syll. xi. 565. All. vii. 497.

Spots very large, irregular, dry, zoned. Pustules concentrically arranged, black, wrinkled, shining. Spores oblong-cylindrical, straight or somewhat bent, obtuse at both ends or truncate, 15–20 × 4–5 μ.

On scorched leaves of cultivated *Rhododendron*. Cornwall. *n.v.*

Ital.

Ribes

Gloeosporium curvatum Oud. in Nederl. Kruidk. Arch. 1867, ser. 2, i. 171. Sacc. Syll. iii. 707. All. vii. 499. Died. p. 786, p. 770, f. 8. T.B.M.S. iv. 178. Gard. Chron. 1907, xlii. 180, f. 77.

Spots fuscous, 1–3 mm. across. Pustules small, rather prominent, bursting the epidermis. Spores oblong, strongly bent or curved, rather obtuse at one end or both, guttulate, 14–22 × 4–5 μ, at first involved in mucus, then expelled in the form of thick white tendrils. (Fig. 96*e*, p. 207.)

On leaves of *Ribes Grossularia*, *R. nigrum*, *R. rubrum*. Ayrshire, Lanarkshire, Dumbartonshire, Perthshire (Boyd). Cornwall (Hurst). Jun.–Sept.

The spots in these specimens are visible on both sides of the leaf, but the spores ooze out on the upper surface. Oudemans describes the spores as 5–7 μ wide. There seems no reason for thinking that this fungus is in any way different from *G. Ribis* M. & D., although Oudemans says "magnopere differt". The spots remain green with a black centre when the rest of the leaf turns yellow.

Holl. Denm. Austr. N. America.

Gloeosporium Ribis Mont. & Desm. in Kickx, Flor. Cr. Flandr. ii. 95. Sacc. Syll. iii. 706; Fung. Ital. pl. 1036. All. vii. 498, with fig. Died. 786. Mig. 538. *Leptothyrium Ribis* Lib. Exs. no. 258. Cooke, Handb. 423. *Gloeosporidiella Ribis* Petr. Myk. Beitr. in Hedwig. lxii. 318. See Duggar, p. 204, f. 79, 80.

Spots round, minute, confluent, brown, 1–2 mm. across. Pustules epiphyllous, blackening the cuticle (and thus seeming to have a peridium), flat, rufous-brown; contents whitish. Spores oblong, curved, subrostrate, at the apex, often pluri-guttulate, $14–20 \times 6–7\mu$ ($10–12 \times 5–6\mu$, Fragoso); sporophores cylindrical, $12–17 \times 1{\cdot}5–2\mu$.

On leaves of *Ribes Grossularia*, *R. nigrum*, *R. rubrum*. Common, but not doing much injury. England; Scotland.
Summer and autumn.

The pycnidial stage of *Pseudopeziza Ribis* Kleb.; see Zeitschr. f. Pflanzenkr. 1906, xvi. 65, pl. 3, 4. The forms on the three hosts are considered to be specialised to each.

It does not seem to differ from *G. curvatum* Oud. In American specimens (f. *americana*) on Black Currant the spores were 15–20 (or even 25)μ long, oblong or clavate, faintly or strongly curved.

Europe, Siberia, U.S.A. Canada.

Rosa

Gloeosporium Rosarum, comb. nov. *Phyllosticta Rosarum* Pass. Erb. Critt. Ital. no. 1092. Sacc. Syll. x. 109. *Sphaceloma Rosarum* Jenkins, in Journ. Agric. Research, 1932, xlv. 321–338. See *supra*, Vol. I, p. 42.

Spots on the leaves round, 1–4 mm. diam., above purple or blackish, surrounded by a broad bright-purple border, ultimately becoming cinereous-white in the centre, below purple and not becoming whitish; spots on the stems similar, round or elongated. Pustules epiphyllous, few or many, often collected into groups, minute, black, ± protruding when older. Spores ellipsoid, hyaline, faintly guttulate, $5–8 \times 3–4\mu$.

On leaves, sepals, petioles, and stems of cultivated Roses. Sussex; Norfolk; Suffolk; Berkshire; etc. Summer.

This disease, first noticed in England in 1926, appears to have become more prevalent in recent years. The whitish centre of the spots is due to the formation of an air-cavity beneath the cuticle. The genus Sphaceloma is founded upon the idea that the tissue around the pustule of spores is thickened and hardened by the disease;

otherwise Sphaceloma is identical with Gloeosporium. The transfer of this species from the Sphaeropsidales to the Melanconiales is parallel to the fate which befell *Actinonema Rosae* many years ago.

Europe, New South Wales, U.S.A.

Rubus

Gloeosporium venetum Speg. in Mich. i. 477. Sacc. Syll. iii. 706. All. vii. 499. Massee, Dis. Cult. Pl. 434. *G. necator* E. & E. in Journ. Mycol. 1887, p. 129.

Spots marginal and large but without any definite form, or central and small and round, ochraceous or honey-coloured, bordered by a purplish-fuscous line. Pustules minute, rather prominent, solitary or gregarious, black. Spores cylindric-ellipsoid, granular and guttulate, $7–8 \times 2–2{\cdot}5\,\mu$.

On leaves and canes of cultivated *Rubus idaeus*; also recorded on Cloudberry (*R. Chamaemorus*), Loganberry, and Blackberry. Kent; Suffolk; Sussex; Berkshire; Oxfordshire; Cambridgeshire; Norfolk; Somerset; Worcestershire; etc.

This has been called "Anthracnose of Raspberry". The injury first appears in the form of small reddish spots, which gradually increase in size and become confluent in large irregular blotches that finally become pallid and are bounded by a dull-red margin. Its ascophorous stage is given as *Plectodiscella veneta* Burkh. = *Elsinoë veneta* Jenk. There is a variety on *Rosa*.

Denm. Ital. U.S.A. Canada.

Salix

Gloeosporium Salicis Westd. Herb. Cr. Belg. no. 1269. Sacc. Syll. iii. 711. All. vii. 500. Died. 787. Mig. p. 538, pl. 72, f. 2. T.B.M.S. 1909, iii. 119; 1913, iv. 36. *Gloeosporidium* v. Höhn. Fragm. Myk. 981.

Spots numerous, small, covering often the whole leaf, crowded, blackish. Pustules epiphyllous, immersed, then prominent, crowded, often confluent. Spores oblong, curvulous, biguttulate, $12–16 \times 4–6\,\mu$, issuing as short white tendrils.

On living leaves of *Salix alba*, *S. Caprea*, and especially of *S. fragilis*. Warwickshire; Worcestershire; Ayrshire; Perthshire; Elginshire, etc. Abundant, but often barren. Jul.–Nov.

Considered by Fuckel and others to be the pycnidial stage of *Trochila Salicis* Tul. (Carp. iii. 181), and Potebnia (Ann. Mycol. 1910, viii. 79) assigns it to his *Pseudopeziza Salicis*, which seems to be the same species. Tulasne (*l.c.*) describes other spores, occurring intermixed, and measuring $6{\cdot}4 \times 2{\cdot}5$, narrow, ovate, and straight.

Europe, N. America.

Taxus

Gloeosporium taxicolum Allesch. in Hedwig. 1896, p. (34); Krypt. Flor. vii. 503. Sacc. Syll. xiv. 1011. Died. 789. Mig. 540.

Pustules epiphyllous, numerous, subepidermal, scattered but rather closely, blackish-brown, round, 300–400μ diam. Spores ellipsoid or obovoid, obtuse at both ends, colourless, often faintly guttulate or granular within, $10–16 \times 5–7\mu$; sporophores crowded, persistent, irregularly linear, hyaline, $20–22 \times 2–3\mu$, rising in a dense array from a thick convex cushion of small faintly brownish cells.

On fading or dying leaves of *Taxus baccata*. Hadzor Hall, Ws. (Rhodes). Feb. Nov.

Not a typical *Gloeosporium*. According to Allescher it is the pycnidial stage of *Phacidium Taxi* Fr., but (?). It is more likely to belong to *Anthostomella Taxi* Grove, in Journ. Bot. 1933, p. 253, which may be a Sphaerulina.

Germ.

Tilia

Gloeosporium Tiliae Oud. Mat. Myc. Néerl. ii. 31, pl. 10, f. 20. Sacc. Syll. iii. 701; Fung. Ital. pl. 1054. All. vii. 503, with fig. Died. 789. Mig. 540. Laubert, in Zeitschr. f. Pflanzenkr. 1904, xiv. 257. T.B.M.S. ii. 55.

Spots (when present) roundish, up to 2 cm. across, ochraceous, bordered by a blackish-brown line (which is visible on both sides of the leaf) or without any distinct border. Pustules hypophyllous, very minute, fuscous, at length erumpent at the apex. Spores oblong-ovoid, acute or obtuse at the ends, granular or guttulate, $10–18 \times 4–7\mu$; sporophores somewhat fusoid, more than half as long as the spore.

On leaves (and rarely petioles) of species of *Tilia*. Common in Scotland, less so in England, but not a serious scourge. Summer and autumn.

All the forms, without spots, with spots, and on the petioles, may be found on the same leaf. It causes the leaf to fall prematurely, and is assumed to winter in sunken blackish patches on the diseased shoots; all such should be burnt. Allescher's two forms are not worth distinction. Cf. *Pseudopeziza Tiliae* Kleb. which is probably the perfect stage.

Europe, as far east as Russia; U.S.A. near New York.

Trifolium

Gloeosporium caulivorum Kirchn. in Zeitsch. f. Pflanzenkr. 1902, xii. 10–14, f. 1–2. Mig. 533. *Kabatiella caulivora* Karak. in

Bot. Mater. Inst. Crypt. Russ. Rep. 1923, pp. 101–8. Sampson, in T.B.M.S. 1928, xiii. 103–42, pl. 5–7. (? Not *Gloeosporium Trifolii* Peck, *q.v. infra.*)

Spots on the leaves dry and brown, roundish, on the stem and petioles elongated, margin of spot very dark-coloured. Spores oval-oblong, ± curved, colourless, eguttulate, 12–25 × 3–4·5μ; no setae.

On leaves, and especially petioles and stems, which it causes to break, of *Trifolium pratense*. Aberystwith (Sampson), and in many English counties, but not seriously.

Apr.–Jul.

It has been recorded, but much more rarely, on *T. repens* and other species of Clover. Possibly introduced from America. It is doubtful if it is really a Coelomycete, for it resembles *Polyspora Lini* Laff. in its appearance and effects. It is recorded also on *Medicago sativa*.
Europe, U.S.A.

Gloeosporium Trifolii Peck, in 33rd Rep. N.Y. State Mus. 1880, p. 26. Sacc. Syll. iii. 705. Lind, Dan. Fung. 479. Died. 790. Naturalist, 1915, p. 145.

Spots roundish, brown, concentrically zoned. Spores oblong or cylindrical, obtuse at both ends, 15–23 × 4–6·3μ.

On living leaves of *Trifolium pratense* (not, as stated in Naturalist, *T. repens*). Mulgrave Woods, Yorkshire! May.

The specimens are preserved in Herb. Kew. They are on *T. pratense*, which is the host on which the American fungus occurred; it was reported on this same host in Denmark as early as 1896 and many times since, as well as on *T. repens* and *Medicago sativa*. No doubt introduced with seed. Cf. *G. caulivorum*, *supra*, and *Colletotrichum Trifolii*, *infra*, p. 236 (a further developmental stage?), which seem to be the same species. *Pseudopeziza Medicaginis* (Lib.) Sacc., which probably belongs here, has been found in Devon and Dorset; see p. 140.
Denm. Germ. U.S.A.

Ulmus

Gloeosporium inconspicuum Cav. Fung. Longob. v, no. 249. Sacc. Syll. xiv. 1010. All. vii. 504. Died. 790. *Asteroma Ulmi* Cooke, *p.p.*

Spots roundish, brown and indistinctly bordered above, ochreous to brown and distinctly bordered below. Pustules on the underside, very inconspicuous, only 30–60μ diam., covered by the cuticle, afterwards open, conical, then flat-

tened, waxy, hyaline. Spores very small, ellipsoid, 1–2 × 0·5–1 μ; sporophores filiform, crowded.

On living and fading leaves of *Ulmus campestris*. Southampton (Rayner). Oct.

The spores which Diedicke (*l.c.*) attributed to this species ("rod-shaped, 3–5 μ long") are those of *Phyllosticta bellunensis* Mart. (*q.v.* Vol. I, p. 49). Presumably the Gloeosporium is merely an early state of the Phyllosticta, which is itself a forerunner of *Phleospora Ulmi* Wallr. = *Septogloeum Ulmi* Died., and that in its turn is a pycnidial stage of *Mycosphaerella Ulmi* Kleb. See p. 291, *infra*; and also cf. Journ. Bot. 1919, pp. 206–8 and 1920, note, p. 251.

Germ. Ital.

Veronica

Gloeosporium Veronicarum Ces. in Bot. Zeit. 1859, p. 629. Sacc. Syll. iii. 710. All. vii. 506. Lind, in Ann. Mycol. 1908, vi. 103. Mig. 541. *Gl. pruinosum* Bäuml. in Oesterr. Bot. Zeitschr. 1889, xxxix. 172. Sacc. Syll. x. 460. All. vii. 506. T.B.M.S. iv. 178. Mig. 541. *Discogloeum Veronicae* Petr. in Ann. Mycol. 1923, xxi. 284; xxvii. 370. *Leptothyrium Veronicae* Lib.

Spots very small, roundish, up to 1 mm. diam., thickened, grey, with a fuscous border. Pustules amphigenous, fuscous, few in each spot. Spores oblong, subclavate, nearly always straight, rounded at both ends, biguttulate or clouded, 14–20 × 3–4·5 μ, emerging and covering the pustules with a cinereous pruina; sporophores short (about 10 × 2 μ, Bäuml.).

On fading leaves of *Veronica Beccabunga*, Ayrshire and Dumbartonshire (Boyd). On stems, leaves, sepals, and capsules of *V. Buxbaumii*, Badsey and Evesham, Ws. (Rhodes & Grove). On *V. agrestis*, Trench Woods, Droitwich (Rhodes). May–Oct.

Recorded abroad also on *V. hederifolia*, *V. officinalis*, etc. Rather common in Worcestershire on *V. Buxbaumii*.

Belg. Germ. Denm. Austr. Hung. Ital.

Vitis

Gloeosporium ampelophagum Sacc. in Mich. i. 217; Syll. iii. 719; Fung. Ital. pl. 1030. Massee, Dis. Cult. Pl. p. 435, f. 135. All. vii. 508, with fig. Died. 791. Mig. p. 542, pl. 71, f. 12–14. *Ramularia ampelophaga* Pass. Nebb. Moscat. 1876, and in Hedwig. 1877, xvi. 122. *Phoma uvicola* Arcang. *p.p.* (*non* B. & Br.). *Sphaceloma ampelinum* de Bary, in Ann. Oenol. 1873, iv. 165–7. Cooke, Pests Cult. Pl. p. 153. *Phyllosticta Labruscae* Thüm. Weinst. Pilz. 189 (on the leaves). Sacc. Syll. iii. 20.

Spots subcircular on the leaves and on the berry, often confluent, occupying the epidermis and the subjacent tissues, hardening them and turning them reddish- or fuliginous-black, but becoming greyish- or rosy-pruinose in the centre from the expelled spores. Pustules nestling under the epidermis, densely gregarious, minute. Spores oblong-ellipsoid, sometimes ovoid, biguttulate, singly hyaline, $5–6 \times 2·5–3·5 \mu$; sporiferous cells ovoid, acute, forming a faintly coloured basal stratum.

On leaves, young green shoots, tendrils, and especially the fruit of *Vitis vinifera*. A great scourge abroad, but rare in Britain. In America it is said to attack the leaves of *Ampelopsis* also.

The ascophorous stage, which is produced on the mummified fruit, is *Guignardia* (*Laestadia*) *Bidwellii* Stevens or *Elsinoë ampelina* Shear. See Gard. Chron. 1895, xvii. p. 101, f. 13, and p. 134; also 1893, xiii. 753, and 1919, lxvi. 46, etc. Cf. *Colletotrichum ampelinum* Cav. Sacc. Syll. x. 470. All. vii. 565.

On the leaves the disease appears in the form of small reddish-brown spots, surrounded by a darker ring; at a later stage the central portion becomes grey, dry and cracked, and often drops out. On the berries the spots frequently assume the form of a bright-red ring inside a dark one; hence the name "Bird's eye" has been given to the disease, which is most frequent on white grapes.

Europe, U.S.A. India, S. America.

EXCLUDED

[**Gloeosporium Podagrariae** M. & D. was reported from Yorkshire in the Naturalist, 1909, p. 220, but examination of these specimens in Herb. Kew shows that they are *Fusicladium depressum*, in company with an immature ascomycetous fungus which is probably the incunabula of the perfect stage of the Fusicladium.]

[**Gloeosporium Populi-albae** Desm. (Died. 783) was reported from Durleston Bay, Dorset (A. D. Cotton), but examination showed that the specimens belonged to *Marssonina Populi* Sacc.]

[**Gloeosporium Violae** B. & Br. in Ann. Nat. Hist. 1878, i. 26. Sacc. Syll. iii. 701. All. vii. 508.

"Spots pallid, at length white. Pustules very few or solitary. Spores orange, issuing and effused over the leaves.

"On leaves of *Viola odorata*. Glamis. *n.v.*

"The effused spores, especially when developed on large white spots, make it a very striking species" (B. & Br.); but it has never been met with since, and was probably merely an early state of *Phyllosticta Violae* Desm.]

COLLETOTRICHUM Briosi & Cavara, Fungh. Parass. no. 50 (*C. Lindemuthianum*), 1889 (*non* Corda).

Pustules on living parts of plants, immersed, then erumpent, rather flat, discoid or elongated, blackish, surrounded or pierced by few or more short blackish-brown hairs. Spores cylindrical or fusoid, hyaline, continuous; sporophores crowded, usually short.

This genus may be defined as a *Gloeosporium* which produces, later or sooner during its growth, a number of soft or bristly hairs on or round its hymenial layer; until these have appeared (which may be only at a late period), it cannot be distinguished from *Gloeosporium*.

Corda gave, as the type of his *Colletotrichum*, the species *C. Lineola* (in Sturm's Deutschl. Kr. Fl. part 3, iii. 41 (1837). But that fungus evidently belongs to the genus *Vermicularia* as instituted later by Fries in his Summa Vegetabilium Scandinaviae, 1849, p. 419 (*V. Dematium*, etc.). Since that time the names have been confusedly used.

Corda's name having priority, but the name Vermicularia having still a very useful part to play (*vide infra*), it seems best to retain the latter name in the Friesian sense, whatever the hide-bound rules of Mycology may ordain. For the convenience of mycological students should be paramount, and the name Colletotrichum has now been so frequently (almost universally) used for what is merely a Gloeosporium furnished with hairs (quite a different thing from Corda's *Lineola*), that it is advisable, on a modified principle of *nomina conservanda*, to accept it in that meaning, while treating *Lineola* as a Vermicularia. This will entail the least divergence from present practice. The attempt to merge Colletotrichum and Vermicularia in one genus is a profound mistake; they are essentially different in their mode of growth.

Bubak's genus Colletotrichopsis (Ann. Mycol. ii. 368) is apparently a Colletotrichum surrounded by a denser wall of bristles than is usual.

Plurivorous

Colletotrichum cinctum Stonem. in Bot. Gaz. 1898, xxvi. 106, pl. 18. *Gloeosporium cinctum* B. & C. North Amer. Fung. no. 504, in Grevill. iii. 13. Sacc. Syll. iii. 721. Grevill. xviii. 74.

Pustules minute, gregarious, surrounded by the blackened epidermis. Spores oblong, obtuse at the ends, occasionally curvulous, biguttulate or granular within, 10–15 × 2·5–4μ; setae usually present, but almost obscured by the spore-mass.

On leaves of Orchids in a conservatory. Glasgow (Boyd).

Also found on leaves of Orchids of many different species, in various countries, and specimens on *Anthurium*, *Dracaena*, etc., have been assigned to the same species.

It appears as minute black raised spots, with a whitish centre, scattered over the leaf, or collected into irregular groups. It has been shown by Stoneman to be the conidial stage of *Gnomoniopsis* (*Glomerella*) *cincta* S. & S.

Denm. U.S.A. etc.

Cucurbitaceae

Colletotrichum lagenarium Ell. & Halst. in Bull. Torr. Bot. Club, 1893, xx. 250. Died. 817. Duggar, 330. *Fusarium lagenarium* Passer. Erb. Critt. Ital. II, no. 148 (1868); see Hedwig. viii. 31. *Gloeosporium lagenarium* Sacc. & Roum. in Rev. Mycol. 1880, p. 201, note 5, pl. 9, f. 1. Sacc. Syll. iii. 719. All. vii. 469. Massee, Dis. Cult. Pl. 439. *Gloeosporium Cucurbitarum* B. & Br. in Linn. Soc. Trans. ii. 68. Sacc. Syll. iii. 720. *Coll. oligochaetum* Cav. in Rev. Mycol. 1889, p. 191, pl. 2, f. 4. Sacc. Syll. x. 469. All. vii. 561.

Spots (on the leaves) epiphyllous, large, roundish, yellow-ochraceous, often conspicuously and concentrically zoned. Pustules minute, scattered, sessile, whitish-flesh-coloured, at length orange. Setae none or 1–3, rigid, olivaceous, 1–2-septate, somewhat inflated at the base, rather obtuse at apex, $60–70 \times 5–7\,\mu$. Spores cylindric or ovoid, sometimes slightly constricted in the middle, obtuse at one or both ends, colourless, granular, often with a guttule in the middle, $13–15 \times 4–5\,\mu$, oozing out as pale yellowish-pink globules; sporophores fasciculate, $10–12\,\mu$ long or longer.

On the leaves and other parts (including fruits) of Melons, Cucumbers, and other Cucurbitaceae. Not common but can be very destructive. Cornwall; Dorset; Essex; Middlesex; Derbyshire; Worcestershire; Yorkshire; etc.

Young seedlings may be attacked and perish quickly. On the fruits, and especially near the tips, deep sunken patches are found, 2–4 inches long; all the infested parts shrivel and die. The setae are for a time often wanting, in which state it was called *Gloeosporium lagenarium*; when present they may be seen with a lens shining out of the spore-mass like little black spikes, and in this state it was given the name *Colletotrichum oligochaetum*. It may be identical with *C. Lindemuthianum*.

Europe, U.S.A. Australia.

Ficus

Colletotrichum Ficus Koorders, Algem. Proefstat. Salatiga, Bull. no. 3, p. 2 (1905); Botan. Untersuch. p. 19, pl. 1, f. 1–22 (1907). Sacc. Syll. xxii. 1204. *Gloeosporium intermedium*, var. *brevipes*, Sacc.

Syll. iii. 703. *G. elasticum* C. & M. in Grevill. xviii. 74. *G. Elasticae* Sacc. Syll. x. 456. Cf. *Neozimmermannia Elasticae* Koord. in Botan. Untersuch. 1907, p. 68, pl. 1–10 and p. 188. Sacc. Syll. xxii. 70.

Spots large, grey or greyish-white, with a darker border. Pustules scattered, chiefly epiphyllous, minute, turning black. Spores narrowly ellipsoid, straight or curvulous, ± rounded at both ends, granular, sometimes guttulate, $12–20 \times 5\mu$, oozing out in pinkish masses when moist; setae generally not in bundles, $40–90\mu$ (or rarely 150μ) long.

On dead leaves of *Ficus elastica*. Botanic Gardens, Glasgow (Boyd).

This fungus is parasitic on leaves of *Ficus* (*elastica* and other species) in Java and similar countries. It grows also saprophytically on the bark of dead twigs, and is therefore only a facultative parasite. It was found that in pure cultures the setae were sometimes absent, and also were so, frequently, upon the leaves. It has been found on *Ficus* in other parts of Europe, and was proved by Koorders to be the pycnidial state of an ascomycete to which he gave the name *Neozimmermannia Elasticae*; on the other hand it is stated by Shear and Wood (in Bot. Gazette, 1907, xliii. 262) to belong to a *Glomerella*.

Linum

Colletotrichum linicolum Peth. & Laff. in Sci. Proc. Roy. Dubl. Soc. 1918, new ser. xv. 368, with 2 plates. Journ. Dept. Agric. Ireland, 1922–3, xxii. 104–7.

Pustules scattered, subepidermal, erumpent, flesh-coloured. Spores oblong-cylindrical or subfusoid, obtuse above, 1-guttulate, about $17 \times 4\mu$; sporophores very short, simple, hyaline, rising from a small subepidermal basal cushion; setae simple, erect, 3-septate, acuminate, dusky-black, paler at the apex, $150 \times 4\mu$.

On living leaves, stems, and seeds of *Linum usitatissimum*. Ireland, uncommon.

Can be distributed by infected seed.
Germ. Japan, Formosa.

Lysimachia

Colletotrichum Lysimachiae Duke, in T.B.M.S. 1928, xiii. 177.

Pustules amphigenous, gregarious, immersed, then erumpent, roundish or oblong, up to 130μ diam., black, beset with setae; setae rigid, straight or arcuate, thick-walled, septate, thicker below, dark-brown, paler at the apex, up to 270

$\times$ 7–8μ. Spores continuous, hyaline, fusoid, gently curved, with a central guttule, 20–28 $\times$ 4–5μ; sporophores cylindrical, hyaline, densely fasciculate.

On leaves, stems, and fruits of *Lysimachia nemorum*. Dinmore, Hereford; Virginia Water, Surrey; Oxford; Littlehampton; Enniskerry, Wicklow. Sept. Oct.

"Allied to *C. trichellum*" (Duke, *l.c.*). But I think it is merely a form of *Vermicularia herbarum* Westd. (*q.v.*).

Malva

Colletotrichum Malvarum Southworth, in Journ. Mycol. 1891, vi. 116. Sacc. Syll. x. 468. All. vii. 561, with fig. Died. 818. Mig. p. 558, pl. 76, f. 15. *Steirochaete Malvarum* A. Br. & Casp. Krankheit. Pflanz. p. 28, pl. 1, f. c (1854). Sacc. Syll. iv. 316. *Colletotrichum Althaeae* Southw. *l.c.* vi. 45, pl. 3. *C. Magnusianum* Bres. Fung. Trident. II. 45, pl. 150, f. 3. Sacc. Syll. xi. 569. *Gloeosporium Malvae* Syd. in Hedwig. 1899, p. (190), before the setae are produced.

Pustules epiphyllous or on the stems, at first yellowish-brown, beset with upright stiff dark-brown 1- or 2-septate bristles which measure 60–109 $\times$ 3–4μ. Spores elongate-cylindrical, obtuse at both ends, singly colourless but flesh-coloured in mass, 11–28 $\times$ 4–5μ; sporophores filiform, simple, 12–18 $\times$ 2–3μ. (Fig. 97*b*.)

On a malvaceous plant, Alyth, Perthshire (Boyd & Wishart, in T.B.M.S. iii. 38). On *Lavatera trimestris*, Langley, Bucks., and Alton, Herts. (Chittenden, *ibid.* iii. 119). On stems of *Malva*, destroying the cortex, New Milton, Hants. (Cotton). A true parasite. Aug. Sept.

This disease has done considerable harm to greenhouse-grown Hollyhocks in the United States, and may do the same in this country. It infests all parts of the plants; see U.S. Dept. Agr. Rep. 1890, p. 407, pl. 1.

Europe, U.S.A.

Orchidaceae

Colletotrichum Orchidearum Allesch. in Rabenh. Kr. Fl. vii. 563. Sacc. Syll. xviii. 467. Died. 819. Mig. 558.

Pustules amphigenous, covered by the epidermis which is at length split above them, small, round, black. Setae simple, straight or slightly bent, with few septa, tapering upwards, dull blackish-brown, 50–100 $\times$ 3–5μ. Spores oblong or sub-cylindrical, rounded at both ends, granular or guttulate

within, almost hyaline, $12–20 \times 4–6\mu$; sporophores fasciculate, short, thick, coloured at the base.

This species is recorded on pseudobulbs of *Coelogyne* (= *Gloeosporium Coelogynes* Sydow), Kew Gardens, Apr. On living leaves of *Oberonia* and other orchids (Orchid Review, 1916, xxiv. 283).

Other fungi on Orchids, which may be forms of this species, are recorded abroad on *Cymbidium, Phyosiphon, Eria,* etc. See also *Gloeosporium Epidendri* Henn., *Gl. Laeliae* Henn., and *Gl. Oncidii* Oud. *Colletotrichum effiguratum* Syd. in Hedwig. 1900, p. (5) seems to be different.

Germ. Austr.

Phaseolus

Colletotrichum Lindemuthianum Br. & Cav. Fungh. Parass. no. 50 (1889). Massee, in Gard. Chron. 1898, xxiii. 293, f. 110; Dis. Cult. Pl. p. 441, f. 136. Duggar, Fung. Dis. p. 322, f. 154–6. Stevens, p. 547, f. 369. Stoneman, in Bot. Gazette, 1898, xxvi. 90, with figs. *Gloeosporium Lindemuthianum* Sacc. & Magn. Syll. iii. 717; Fung. Ital. pl. 1132. All. vii. 488, with fig. Died. 781. Mig. p. 534, pl. 71, f. 5–7.

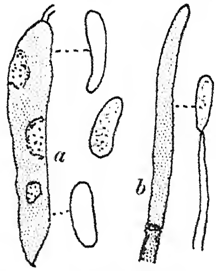

Fig. 97. *Colletotrichum*: *a*, *C. Lindemuthianum*, on a pod of *Phaseolus*, reduced; and spores of the same, $\times 600$; *b*, *C. Malvarum*, spore on sporophore, $\times 600$, and apex of hair, $\times 500$.

Spots on the stems (rarely on the leaves and then epiphyllous), but most often on the fruits, roundish, becoming brown on drying, at first surrounded by a reddish border. Pustules dingy-white, inflating the epidermis in the middle of the spot, then erumpent. Spores oblong, straight or slightly curved, rounded at both ends, granular within, but colourless, $15–19 \times 3{\cdot}5–5{\cdot}5\mu$; sporophores fasciculate, cylindrical, simple, $45–55\mu$ long; setae few, sometimes absent, dark-coloured. (Fig. 97*a*.)

On pods, etc., of *Phaseolus multiflorus, P. nanus, P. vulgaris.* In many parts of England and Wales (Surrey, Suffolk, Worcestershire, Lancashire, Northumberland, Yorkshire, etc.); also in Ireland. Summer.

This disease, which is known as Anthracnose of Bean, can be very destructive; it can be transmitted by infected seed. It contorts the young pods, and prevents them from attaining full size. It seems to have been first observed in England by the Rev. M. J. Berkeley in

1881. The setae not being always present, it was at first considered to be a *Gloeosporium*. Cf. also *Septoria leguminum* Pass. in Syll. x. 468.

It does not differ much from *C. oligochaetum*, and might be considered merely a form of it, but Stoneman insists on their non-identity. Its ascophorous form is said by some to be = *Glomerella rufo-maculans*; Shear named it *Glomerella Lindemuthiana*. See *Ascochyta rufo-maculans*, Vol. I, p. 320. Evidently the authorities who have pronounced on this subject require a little more experience before they can arrive at the whole truth.

Europe, N. America, S. America, Africa, Australia, India.

Solanum

Colletotrichum phomoides Chester, in 6th Ann. Rep. Delaware Coll. Agric. Expt. Sta. 1894. Brookes & Searle, in T.B.M.S. 1921, vii. 194. *Gloeosporium phomoides* Sacc. in Mich. ii. 540; Syll. iii. 718; Fung. Ital. pl. 1060.

Spots roundish, at length sunken. Pustules immersed, then erumpent, brownish-grey, pulvinate. Spores oblong or subclavate, rounded above, abruptly attenuated downwards, hyaline, biguttulate, $10–12 \times 2{\cdot}5–3\mu$ ($14–24 \times 3–4{\cdot}5\mu$, averaging $21 \times 4\mu$, B. & S.), exuding as pinkish or orange masses which soon become effused; sporophores linear, fasciculate, hyaline, $20–21 \times 1{\cdot}5\mu$, rising from a brownish proliferous stratum; setae not common.

On the epicarp of fruits of *Solanum Lycopersicum*, Cambridge (Brooks & Searle).

The setae are often very few, and sometimes none at all in artificial cultures. See Shear & Wood, in U.S. Dept. Agric. Bur. Pl. Ind., Bull. 252 (1913), where it is said to have an ascophorous stage belonging to Glomerella.

Ital. U.S.A.

Colletotrichum Lycopersici Ell. & Ev. N. Americ. Fung. new ser. no. 2868. Chester, in Bull. Torr. Bot. Club, 1891, xviii. 372. Sacc. Syll. xi. 570; xxii. 1203. Stoneman, in Bot. Gaz. 1898, xxvi. 95. Naturalist, 1900, p. 341.

Spots depressed, roundish, slightly discoloured, black in the centre, 5–10 mm. diam., afterwards becoming confluent and irregular. Pustules abundant, densely gregarious, rusty-brown to black, flat, $90–150\mu$ diam. Setae abundant, smoky-brown, generally curved, rarely undulate or straight, often geniculate, gradually tapering, septate, $65–112 \times 5\mu$ at base.

Spores oblong, ends subacute, hyaline, 2–3-guttulate, 16–$22 \times 4\mu$; sporophores slender, 30–40μ long, on a well-developed basal stratum.

Reported on haulms of *Solanum tuberosum*. Near Worcester (Rea); Lythe, near Whitby. *n.v.*

The American species of Ellis & Everhart was on the fruit of the Tomato. But the British records given above evidently belong merely to *Vermicularia atramentaria* (*q.v.* p. 244) which is common on old potato haulm.

U.S.A.

Trichosanthes

Colletotrichum concentricum Massee, in Kew Bull. 1913, p. 198, f. 14–16. Cf. *Coll. lagenarium* Ell. & Halst. *supra*, p. 231.

Spots amphigenous, effused, becoming dry and whitish, distinctly bordered. Pustules aggregated, orange, occupying the whole spot, disposed in one or more concentric circles. Spores cylindric-ellipsoid, rounded at both ends, straight or slightly inequilateral, hyaline, 21–28×7–8μ; sporophores filiform, hyaline; setae straight, acuminate, blackish-brown, opaque, 80–100×6–7μ.

On the fruit of the Snake Gourd, *Trichosanthes Anguina*, in the Lily House, Kew Gardens (Massee).

"A destructive parasite, forming large bleached patches which become covered with irregularly concentric rings of orange spore-masses" (Mass.). The pustules are surrounded at first by a faint brown border, from which at intervals a few setae arise; these ultimately disappear, leaving the orange spore-masses unbordered. I make the spores to be 15–25×4–6μ in their present state.

Trifolium

Colletotrichum Trifolii Bain, in Journ. Mycol. 1906, xii. 192–3. T.B.M.S. xiii. 105.

Spots black or fuscous. Pustules scattered or gregarious, slightly erumpent. Spores hyaline, straight, rounded at both ends, 11–13×3–4μ; sporophores hyaline, fusoid or cylindrical, about as long as the spore; setae mingled with the spores, continuous or 1-septate, few or many, fuliginous, paler at the apex, often sinuous or nodulose, 39–62×4–7μ.

On stems of *Trifolium pratense*. Aberystwith. July.

Artificially produced by inoculation (Miss K. Sampson); it is an American species, very destructive in Tennessee, Virginia, etc. to the

Trifolium and to *Medicago sativa*. Cf. *Gloeosporium spadiceum* Dearn. & Bisby, in Fungi of Manitoba, p. 133; also *G. caulivorum* and *G. Trifolii, supra*, pp. 226–7.

Holl. U.S.A. etc.

[**Colletotrichum Wahlenbergiae** Duke, sp. nov. in T.B.M.S. xiii. 177, f. 5, can hardly belong to this genus, for the spores have a very different character. Species of Colletotrichum are recorded in the U.S.A., *inter alia*, on *Pisum sativum* (*C. Pisi*, with or without setae), on *Spinacia oleracea* (*C. Spinaciae*), on *Viola tricolor*, cult. (*Coll. Violae-tricoloris*, with *Cercospora Violae*) and on *Viola odorata*, *Digitalis purpurea*, and *Asparagus officinalis*. These will very probably occur in Britain also.]

VERMICULARIA Fr. Summ. Veg. Scan. p. 419, 1846–9 (emend.).

Pustules on (living or fading, but more often) dead parts of plants, immersed, at first conical or convex, then bursting the outer covering and sending up a tuft of dark-coloured stiff divergent bristles through the opening, at length emerging and producing a discoid spore-bearing layer surrounded by a fringe of long bristles; a few of the bristles may be scattered over the disc. Spores hyaline, continuous or pseudo-uniseptate, more or less elongated or fusoid, straight or curved or falciform, with somewhat acute extremities; sporophores usually short and obtuse, faintly coloured.

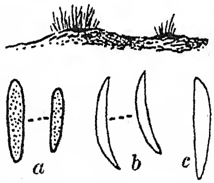

Fig. 98. *Vermicularia*: *V. atramentaria*, on *Solanum*, ×20. Spores of, *a*, *V. atramentaria*; *b*, *V. circinans*; *c*, *V. trichella*; all ×600.

As stated under Colletotrichum, this genus has been considered by some to be a section of that other genus. But it is really very different. The difference lies chiefly in the fact that in Vermicularia the bristles are an essential element, being often produced in large numbers and protruding above the matrix when hardly any mature spores have as yet arisen; whereas in Colletotrichum the bristles are, as it were, unessential—as if they were an afterthought; they may or may not be produced. Ripe spores of Colletotrichum at any rate are found in abundance on a complete hymenium whether

the bristles are many, few, or none. Young specimens of Vermicularia on the contrary will be often seen to show only the bristles fully developed, without any spores.

Saccardo's idea (Syll. iii. 222) that Vermicularia typically has a peridium is a mistake. Diedicke considers Vermicularia to be a Hyphomycete: in consequence, by a misunderstanding, no species of Vermicularia appear among either Diedicke's Coelomycetes of Brandenburg or Lindau's Hyphomycetes of Germany, so that a Brandenburg student would be left quite in the dark.

Plurivorous

Vermicularia Dematium Fr. Summ. Veg. Scan. 420. Cooke, Handb. 438. Sacc. Syll. iii. 225. All. vi. 495. Stevens, 496. *Sphaeria Dematium* Pers. Syn. 88. *Excipula hirta* Fr. *p.p.* Cf. Died. 234.

Pustules gregarious, at first covered, then erumpent, at length superficial, 65–500μ diam., subconical when young, finally convex or plano-depressed, black, hispid with rigid divergent bristles which are black, paler at the apex, very sparsely and faintly septate, $150–250 \times 5–7\mu$. Spores fusoid, curved, $\pm$ obtuse above, but pointed with the point deflected to one side below, somewhat cloudy within, sometimes shortly aristate at both ends, $20–28 \times 3–5\mu$; sporophores brownish, filiform or oblong, septate, obtuse, $15–30 \times 3–4\mu$, rising from a thick dark-brown stromatic mass or subiculum.

On all kinds of dead herbaceous stems, also on stout petioles, etc., e.g. *Arctium*, *Atriplex*, *Gramineae*, *Heracleum*, *Iris*, *Lilium*, *Lupinus*, *Polygonum*, *Rubus*, *Urtica*, etc. Common everywhere in Britain.

Though generally a saprophyte, it is accused of causing a disease of Asparagus (Zeitschr. f. Pflanzenkr. 1895, v. 92), and of Sainfoin and Ginseng. It is recorded also abroad on *Clematis*, *Corylus*, etc. See All. vi. 495–6.

The spores when free are irregularly fusoid, curved, $\pm$ falcate, frequently more acute at one end which is often bent to one side as if beaked. At maturity, the dark-brown (black) hymenial layer is surrounded by a dense fringe of bristles. These bristles, as in all species of the genus, are of course not visible till the epidermis is burst, and frequently fall off when old. There is a var. *minor*, which is much less conspicuous, but has the same spores and sporophores; it is like *V. herbarum* Westd., but that species is altogether more delicate, the bristles are less rigid (rather flexuous), and the spores are oblong and less falcate, measuring about $20 \times 4\mu$.

Var. **Eryngii** Fckl. = *Vermicularia Eryngii* Desm. Pl. Crypt. Fr. ser. 1, no. 542. Fckl. Symb. Myc. 374. Sacc. Syll. iii. 227. *Colletotrichum Eryngii* Duke, in T.B.M.S. xiii. 170. *Excipula Eryngii* Corda, Ic. i. 24, f. 29.

Very similar to *V. Dematium*; spores 18–25 × 3·5–4·5μ.

On leaves, petioles, and stems of *Eryngium giganteum*, *E. Oliverianum*, *E. Sanguisorba*. Kew Gardens (Duke). Ayrshire (Boyd). Sept.

This is not the same fungus as that which is preserved in the Kew Herbarium, under the name *Vermicularia Eryngii* Desm., on *E. maritimum*, from Scotland (Greville) and Fleetwood (Bloxam), for that has no bristles and has spores 8–10 × 1·5–2μ; see *Phomopsis eryngiicola* Trav. in Vol. I, p. 235. Some foreign specimens of *V. Eryngii* agree with Miss Duke's, but differ from *V. Dematium* only in having larger pustules and more numerous and longer bristles.

Europe, N. & S. America.

Vermicularia herbarum Westd. Exs. no. 393. Kickx, Flor. Crypt. Flandr. i. 405. Sacc. Syll. iii. 226. Mig. 148. Cf. Died. 233–4; All. vi. 502.

Pustules loosely gregarious, erumpent, then superficial, rather flat, 300–500μ diam., black, beset with a number of unequal rigid (up to 100μ long) diverging brown bristles. Spores cylindrical or subfusoid-lanceolate, nearly always straight, obtuse or somewhat acute at the ends, colourless, granular within, 18–22 × 3–4μ, often with a minute central guttule.

On *Digitalis*, Ayrshire (Boyd). On dead stems and leaves of *Solanum tuberosum*, Badsey, Ws. Sept.

Forma **Dianthi** Westd.

On dead leaves of cultivated Carnations, Kew (Miss Wakefield). Middlesex, etc.

Distinguished from *V. Dematium* by its nearly straight spores, and from *V. atramentaria* by its larger and less crowded pustules.

Fr. Belg. Swed. S. Africa.

Allium

Vermicularia circinans Berk. Gard. Chron. 1851, xi. 595, with figs.; 1857, p. 57, with fig. Cooke, Handb. 439. Sacc. Syll. iii. 233. All. vi. 495. Massee, Dis. Cult. Pl. p. 417, f. 130. Stevens, 497. Stoneman, Bot. Gaz. 1898, xxvi. 98, f. 16. *Colletotrichum circinans* Vogl. See Walker, in Journ. Agric. Res. 1921, xx. 693, and Archer, in Ann. Mycol. 1926, xxiv. 67.

Pustules concentrically arranged, forming orbicular spots, seated on a subhyaline branched articulated radiating mycelium, 100–200μ broad, occasionally larger, clothed with long black rigid bristles. Spores oblong-fusoid, slightly curved, equally attenuated toward each end, but blunt at the extreme apex, with two or more guttules, sometimes pseudo-uniseptate, $16–20 \times 3–3·5\mu$; sporophores linear, flexuous, sparsely septate, pale-brownish, about twice as long as the spore. (Fig. 98*b*, p. 237.)

On the dry outer scales of bulbs of *Allium Cepa*. King's Cliffe; Evesham; etc. Aug.

Rarely found in this country, but sometimes appearing on imported "sets". It may attack young seedlings also, being possibly imported with the seed.

In Berkeley's original specimens the bristles are well developed before the spores are formed.

The pustules are arranged in wavy lines, or in concentric circles which are darkest in the centre. This disease may spread rapidly from bulb to bulb, if they are confined in a close damp atmosphere. The mycelium radiating from the pustules is very abundant and resembles that of *V. Dematium*, but is only faintly brownish; the spores are like those of that species, but smaller; the bristles are up to 200μ long, usually without septa, dark-brown, straight, acuminate. Saccardo records what he considers to be the same species on the scapes and leaves of *A. Cepa* in Italy, but his specimens have pustules that are not circinate, the bristles are inclined to be septate, and the subjacent mycelium is brown; they may be a form of *V. Liliacearum*. A supposed ascophorous stage has been named *Cleistothecopsis circinans*.

Fr. Ital. Spain, U.S.A. Canada.

Citrus

Vermicularia gloeosporoides Penz. in Mich. ii. 450. *Colletotrichum gloeosporoides* Penz. Fung. Agrum. ii. 6. Sacc. Syll. iii. 735; Fung. Ital. pl. 1188. All. vii. 558, 560, with fig. T.B.M.S. x. 108.

Pustules scattered or loosely gregarious, immersed, without a trace of a peridium, then erumpent, depressed, black. Setae cylindrical, rounded at the apex, surrounding the margin of the pustule, continuous or with few septa, fuliginous-black, $40–90 \times 5–6\mu$. Spores cylindrical, straight, rounded at both ends, hyaline, cloudy-granular within, 16–$18 \times 4–6\mu$; sporophores densely fasciculate, cylindrical, apex

rounded, base pale-smoke-coloured, eseptate, 18–25 × 4–5 μ, bearing the spores at the apex.

On both sides of a leaf of *Citrus*; can also infect Apple, see T.B.M.S. *l.c.*

Penzig changed this species from Vermicularia to Colletotrichum (not *vice versâ*) because he accepted Saccardo's erroneous belief that Vermicularia has a peridium. Saccardo figures the pustules as scattered over large discoloured patches of the leaf, and the spores as biguttulate. The var. *Hederae* Passer., described in Sacc. Syll. x. 470, has spores 18–20 × 5–6 μ; but see *V. trichella, infra.*

Ital. Roumania, S. America.

Desmodium

[**Vermicularia uncinata** Berk. & Curt. North Amer. Fung. no. 431, in Grevill. iii. 6. Sacc. Syll. iii. 226.

"Pycnidia distinct, clothed with short bristles; spores with a short pedicel, rather arcuate, with the apex suddenly turned over, ·0026 [inch] long, hyaline, with a broad distinct border" (Grevill. *l.c.*).

"On stalks of *Desmodium nudiflorum*."] North America. This has been recorded on twigs of Desmodium, Kew Gardens, but an inspection of these specimens (in Herb. Kew), which are accompanied by a sketch, shows that the supposed spores are nothing but the smaller hairs of the host-plant. Unfortunately all the specimens proved barren of spores, but they do not differ much from *V. Dematium*.

Gramineae

Vermicularia Lineola, comb. nov. *Colletotrichum Lineola* Corda, in Sturm's Deutschl. Flor. part 3, iii. 41, pl. 21 (1837). Sacc. Syll. iii. 736; Fung. Ital. pl. 1500. All. vii. 556, with fig. Grove, in Journ. Bot. 1916, p. 218. Mig. p. 560, pl. 76, f. 11–14.

Pustules small, crowded, black, erumpent, bristly. Spores fusoid, arcuate, subacute at both ends, hyaline, 1–3-guttulate, 25–28 × 3·5–4 μ; sporophores short. Bristles arranged sometimes in rows, at other times collected into a group so as to give a false appearance of a pycnidium, smoky-brown, paler upwards, acute, about 60 × 3 μ.

On sheaths and culms of *Dactylis glomerata*, Olton, Wk. (spores 22–27 × 2·5–3 μ). May, June.

Var. **Phragmitis** Grove, *l.c.* pl. 543, f. 10 *b*.

On *Phragmites*, Cheshire (Ellis).

Forming numerous, small, crowded spots. Spores 15–25

$\times$ 3–4μ, eguttulate; bristles erect, 50–70 $\times$ 2·5–3μ, arranged in a circle around the hymenium.

This species is distinctly a Vermicularia in the Friesian sense, but was given as the type of his Colletotrichum by Corda. Since then a great confusion has arisen in the use of Corda's name, which can only be allayed by boldly cutting the Gordian knot.

Fr. Austr. Bohemia, Ital. U.S.A.

Vermicularia Holci Syd. in Hedwig. 1899, p. (137). Sacc. Syll. xvi. 894. All. vii. 859. *Colletotrichum Holci* Grove, in Journ. Bot. 1918, p. 341, pl. 550, f. 16. Duke, in T.B.M.S. xiii. 178.

Spots fuscous, scattered, oblong, then including the whole leaf. Pustules amphigenous, scattered or arranged ± in lines, lens-shaped, black, 90–120 $\times$ 50–60μ, beset with 12–20 curved bristles; bristles chestnut-brown, eseptate, often bulbous at the base, tapering to a paler point, 80–100μ long. Spores fusoid, curved or lunate, sometimes subacute at one or both ends, minutely pluriguttulate, 20–30 $\times$ 3–5μ.

On fading leaves of *Holcus*: West Kilbride, Ayrshire, on *H. mollis* (Boyd); Hereford; Churchill, Ws., on *H. lanatus*. On *Anthoxanthum*: Ayrshire (Boyd); Aberystwith. Jul. Aug.

There are several other Vermicularias recorded in neighbouring countries, very like *V. Holci*, which may also be found here:

V. Melicae Fckl. (Sacc. Syll. iii. 234) has spores 26 $\times$ 4–5μ, which were said to be 1-septate (? owing to a central guttule).

V. culmigena Desm. (*ibid.* p. 235), on leaves of *Dactylis* and *Phleum*, has its pustules arranged in parallel lines, short setae, and pluriguttulate cylindrical spores 10–12 $\times$ 1·5–2μ.

V. graminicola Westd. (*ibid.* p. 235), on leaves of *Poa*, has fusoid, nearly straight spores, 30 $\times$ 5μ, with 2–4 guttules. This last has been named *Colletotrichum graminicolum* Wilson, in Phytopathology, 1914, iv. 110 (Sacc. Syll. xxv. 570).

Hedera

Vermicularia trichella Grev. Scot. Crypt. Flor. (1828), pl. 345. Fr. Summ. Veg. Sc. 420. Cooke, Handb. p. 438, f. 161. Sacc. Syll. iii. 224. All. vi. 496. Stevens, 496. *Sphaeria trichella* Fr. Obs. Mycol. ii. 332 (1818); Syst. Myc. ii. 515. *Sph.* (*Vermicularia*) *trichella* Fr. El. Fung. ii. 109. *Amerosporium trichellum* Lind, Dan. Fung. 471. *Colletotrichum gloeosporoides* Penz., var. *Hederae* Pass. Sacc. Syll. x. 470. *C. hedericola* Laubert, in Arb. Kais, Biol. vi. 503. Mig. 557. *C. trichellum* Duke, in T.B.M.S. xiii. 173, with fig. on p. 162.

Spots irregular, pallid-brown, with a darker border, or sometimes (on dead leaves) very indistinct. Pustules scattered or densely gregarious, up to 100μ diam., covered by the epidermis which becomes elevated and wrinkled, then erumpent by laciniae, blackish, clothed at the top when young, and especially around the margin when older, with long divergent black 2–3-septate bristles, 70–150 × 6–8μ. Spores fusoid, curvulous, bluntly attenuated at both ends, cloudy within, 16–25 × 4–5μ (26–32 × 5–6μ, Lind); sporophores oblong, obtuse or pointed, eseptate or pseudo-uniseptate, nearly colourless, 16–20 × 3–4μ, rising from a pale-coloured proliferous stratum. (Fig. 98 *c*, p. 237.)

On living or dead leaves and petioles of *Hedera Helix*. Rather uncommon: England, Scotland, Ireland. Oct. Nov.

As will be seen from the synonymy this species has had an adventurous history. It is truly parasitic on living leaves of Ivy and continues to grow on the dead fallen leaves.

It is said to have occurred on dead leaves of *Ilex Aquifolium* and, abroad, of *Pyrus Malus* (f. *Pomona* Sacc.) and *Euonymus*. But the records on other leaves (*Arum*, *Castanea*, *Magnolia*, *Quercus*, *Salix*) and on the living parts of many pomaceous hosts are probably mostly incorrect; e.g. the specimens of Desmazières on *Quercus* and of Roumeguère on *Magnolia* are quite different. In numerous cases black knots of mycelium, or the beginnings of perithecia bearing the brown hyphae of a hyphomycete, have been mistaken for it.

Some observers say that the spores become 1-septate, Greville figures them as 2–3-septate, but this is in most cases due to the presence of minute guttules which produce the false appearance of a septum; in nearly every case a higher power of the microscope will dispel the illusion.

Europe, U.S.A.

Liliaceae

Vermicularia Liliacearum Westd. Fl. Bat. Fung. ii. 113. Sacc. Syll. iii. 233. All. vi. 506. *V. Liliaceorum* Schwein. Syn. Am. Bot. no. 1884, on *Allium*, *Hemerocallis*, etc. Sacc. Syll. iii. 232. *Colletotrichum Liliacearum* Ferraris, in Malpigh. 1902, xvi. 35.

Pustules scattered, minute, immersed, round or oval, convex, shining, black, surrounded by a faint brown stain, beset with bristles, then surrounded by a fringe of them. Spores oblong-fusoid, curvulous, more attenuated at one end, 16–20 × 3μ.

On dead scapes of *Scilla nutans* and *Convallaria*. Near

Oxford (Baxter). Kew Gardens; Mickleham; Ladywood, Besford Court, Ws.; etc. Autumn.

This is reported also on *Alstroemeria* and *Iris*, but these do not differ, except in habitat, from many of the other minute described species. The pustules on *Scilla*, which measure about 250μ in diam., must not be confounded with the larger black sclerotia of Botrytis often occurring on the same scapes. The spores are often pseudo-uniseptate. Schweinitz's specimens are exactly the same as ours on *Scilla nutans*.

Europe, U.S.A. Canada.

Rubus

Vermicularia Volutella, comb. nov. *Colletotrichum Volutella* Sacc. & Malbr. in Mich. ii. 643; Syll. iii. 736. All. vii. 565. Grove in Journ. Bot. 1916, p. 219, pl. 543, f. 10 *a*.

Pustules scattered or aggregated, immersed, then erumpent, plano-convex, oblong, black, 1·5 × 0·75 mm.; disc grey, surrounded and penetrated by straight pointed septate smoky-brown bristles which are thickened at the base and measure 250–350 × 5μ. Spores cylindric-fusoid, curvulous, acute at both ends, 2–4-guttulate, 14–18 × 2·5–3·5μ (13–18 × 2μ, Ellis); sporophores inconspicuous.

On dead stems of *Rubus fruticosus*, Cheshire (Ellis). Mar.

Some of the spores had at one end a curious curled appendage (? sporophore); see fig. in Journ. Bot. *l.c.*

Fr. (on *Spiraea Ulmaria*).

Solanum

Vermicularia atramentaria B. & Br. in Ann. Nat. Hist. 1850, v. 378. Cooke, Handb. 438. Sacc. Syll. iii. 227. All. vi. 512. Mig. 149. *V. maculans* Desm. Exs. no. 339 (on *Solanum*). Sacc. Syll. iii. 228. *V. orthospora* Sacc. & Roum. Syll. iii. 227. *Colletotrichum solanicolum* O'Gara, in Mycologia, 1915, vii. 39. *Coll. tabificum* Pethybr. in T.B.M.S. vi. 109; see Ann. Appl. Biol. 1924, xi. 244–250. *Vermicularia varians* Ducom. in Ann. École Nat. Agric. Rennes, 1908, vol. ii. *Coll. Lycopersici* Ell. & Ever., in Naturalist, 1900, p. 341.

Pustules effused, gregarious, even crowded, black, 200–350μ diam., clothed with long brown straight, somewhat pointed, sparsely septate bristles (up to 200μ long, 5μ broad), and surrounded at the base by intricate fibres which creep beneath the epidermis of the matrix and form large or small velvety black or dark-violet patches. Spores linear, straight, obtuse at both ends, even subclavate, cloudy or granular

within, often provided with a guttule in the middle, 16–22 $\times 3$–4μ; sporophores short, oblong, brownish. (Fig. 98, p. 237.)

On decaying haulm of *Solanum tuberosum*. England, Wales, Scotland, Ireland. Not uncommon. May cause a little harm by growing on haulm that was dying off.

Distinguished at once from *V. Dematium*, which it resembles in appearance, by its nearly straight spores. Berkeley's statement that the protoplasm is "retracted to either extremity" is taken by Saccardo to mean that the spores are guttulate at each end; but this is a mistake, Berkeley meant that there is at times a division of the protoplasm in the middle, but without the formation of a septum. The spores are generally quite straight and ± cylindrical, with only the faintest narrowing toward the base.

The patches of colour on the stem of the Potato are rarely as black as ink, but rather dark-violet or brownish-black; accompanying the Vermicularia, however, there may be a Phomopsis which does produce inky-black patches. Taubenhaus (Mem. N.Y. Bot. Gard. 1916, vi. 549–60, with 3 plates) says that *V. atramentaria* is a saprophyte or weak parasite, and that its early stage is what has been called *Phellomyces sclerotiophorus*.

Europe, U.S.A. Canada, S. Africa, Australia, India.

MYXOSPORIUM Link, Sp. Pl. Fung. ii. 99.

Pustules nestling under the periderm or the epidermis of woody plants, generally on branches, rather soft, ± pallid or reddish. Spores hyaline or pale-coloured, ovoid, ellipsoid, or lanceolate, frequently large, usually mixed with a consider-

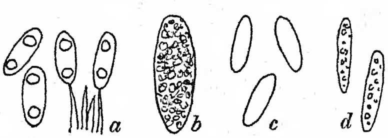

Fig. 99. *Myxosporium*: *a*, *M. Carpini*; *b*, *M. Roumegueri*, on *Quercus*; *c*, *M. carneum*, on *Fagus*; *d*, *M. Lanceola*, on *Quercus*; spores, all ×600.

able quantity of mucilaginous or oily matter; sporophores filiform or linear, often rather stout, somewhat persistent, straight or slightly flexuous.

Similar in some ways to Gloeosporium, but less parasitic. The species are much confused. Some of them form stages of Diaporthe; others, as will be seen from what follows, are

merely simplified forms of Fusicoccum; these last two sentences are in fact two aspects of the same truth.

Diedicke's genus Myxofusicoccum was framed partly to include these intermediate forms. He, like von Höhnel and Petrak, seems to assert that, under certain conditions, the spores of species of that genus and of other genera called Sclerophoma, Sclerophomella, etc., arise, not from sporophores like ordinary coelomycetous spores, but from an "endogenous" linear disintegration of some cells of the "stromatic tissue", so that the disintegrated cells are involved or embedded in a mucus in which they gradually mature into spores.[1] This hypothesis, as van Luyk has pointed out, is almost entirely devoid of truth. The spores of all these genera arise on shorter or longer sporophores in the usual way. Cf. Sclerozythia, *supra*, p. 118, where a similar thing seems to prevail.

Plurivorous

Myxosporium abietinum Rostr. in Tids. Skov. xiii B, 98, and Plantepatologi, p. 586. Lind, Dan. Fung. 480. Gregor, in Annals Bot. xlv. 73–90, with figs. and plate (1931). *Cryptosporiopsis abietina* Petrak, in Ann. Mycol. xxiii. 125.

Pustules convex-conical, opening by a roundish or transversely linear-oblong slit (0·5–2 mm. long), densely gregarious beneath the outer bark, ("reddish-fuscous" Rostr.). Spores oblong, rounded at the ends or truncate below, granular-guttulate within, rather thick-walled, colourless or faintly brownish when old, $20–30 \times 9–10\mu$ ($22–28 \times 8–12\mu$, Rostr.); sporophores oblong, thicker upwards, colourless, continuous, $12–16 \times 4–5\mu$.

On bark of *Pseudotsuga Douglasii*. New Forest; Harpenden. From Devon and also from many places in Scotland, on *Abies*, *Pinus*, *Picea*, *Larix*, *Cupressus*, etc. as well as on *Pseudotsuga* (Gregor).

The pycnidial stage of *Dermatea livida* Phill.

Minute oblong spores, $4–5 \times 1·5–2\mu$, on linear sporophores $10–17\mu$ long, occur mixed with the other spores. These are the Cytospora-like spores which Tulasne so often met with and called spermatia (Carp. ii, *passim*); they occur in very many other species of Coelomycetes in a similar way.

Germ. Denm.

Myxosporium carneum Lib. Exs. no. 882. Sacc. Syll. iii. 726; Fung. Ital. pl. 1076. All. vii. 519, with fig. Died. p. 796, p. 770, f. 14. Mig. 545. Grove, in Journ. Bot. 1918, p. 320.

[1] See v. Höhnel, in Hedwig. 1918, lix. 245; Petrak, in Ann. Mycol. 1921, xix. 26, and 1923, xxi. 267; Dodge in Journ. Agric. Res. 1923, xxiii. 743.

Pustules covered by the periderm, then erumpent, pulvinate, somewhat rose-coloured, rather large, at length surrounded by laciniae. Spores fusoid, obtuse at both ends, sometimes inequilateral, $15–17 \times 3{\cdot}5–4{\cdot}5\mu$, hyaline, biguttulate; sporophores subulate, about $15 \times 2{\cdot}5–3\mu$. (Fig. 99 *c*.)

On dry branches of *Fagus silvatica*. Colwich, Staffs. (Rhodes). Looe (Rilstone). Guildford; Oscott College.

But see *Fusicoccum galericulatum*, of which it is doubtless a less perfectly developed state. It differs from *M. incarnatum* in the smaller and narrower spores; but is equally plurivorous.

Belg. Germ. Denm. etc.

Myxosporium incarnatum Bon. Handb. 56. Sacc. Syll. iii. 722; Fung. Ital. pl. 1073. All. vii. 520 with fig. Died. p. 796, p. 770, f. 17. Mig. p. 544, pl. 74, f. 10–13. Ellis, in T.B.M.S. 1916, v. 230. *Naemospora incarnata* Desm. in Ann. Sci. Nat. 1830, xix. 272, pl. 5, f. 2.

Pustules covered by the epidermis, variously extended, flat or slightly swollen, flesh-coloured. Spores ovoid or obpyriform, granular within, pale flesh-coloured, $15–20 \times 8–10\mu$, issuing in pinkish tendrils; sporophores filiform, $20–24 \times 2\mu$.

On dead bark of *Carpinus Betulus*, West Kilbride, Ayrshire (Boyd). A form on Apple, found at Wisbech, was referred to this species.

Recorded abroad also on *Crataegus*, *Gleditschia*, *Rhamnus*, *Populus*, and *Salix*. But see *M. Roumegueri*, which is very similar and probably identical, since it differs from this chiefly in the absence of the pinkish tinge, which in many species is known to be unessential.

Fr. Belg. Germ. Ital.

Myxosporium Roumegueri Sacc. in Mich. ii. 354. *M. incarnatum* var. *Roumegueri* Sacc. Syll. iii. 722; Fung. Ital. pl. 1074. Died. 794. Mig. 544. Grove, in Journ. Bot. 1922, p. 145.

Pustules scattered, sometimes densely crowded, then raising the epidermis and splitting it rimosely, up to 500μ diam. or more. Spores oblong-ellipsoid or at times subovoid, very obtuse at the ends, occasionally curved, thick-walled, cloudy within, often with a large guttule, 25–30 (or even 32) $\times 9–12\mu$; sporophores oblong or linear or filiform, obtuse, up to $20 \times 2–4\mu$. (Fig. 99 *b*.)

On dead twigs of *Cytisus Laburnum*, Cheshire (Ellis); Oscott College (Rhodes). On dead bark of *Corylus Avellana*, Ayrshire (Boyd), f. *coryleum* Died. On *Fraxinus excelsior*, common: Warwickshire, Worcestershire, Staffordshire, f. *Fraxini*. On acorns of *Quercus Ilex*, Hadzor Hall, Droitwich, f. *Quercus*. On dying *Rhododendron*, Pipe Hayes Park, Birmingham. On *Ilex Aquifolium*, Sutton Park. On *Cornus alba*, *C. sibirica*, Ayrshire; Birmingham.

This differs from *M. incarnatum* chiefly in the larger spores, which do not show any tinge of pink.

Germ. Ital.

Alnus

Myxosporium bellulum Sacc. Syll. iii. 727. All. vii. 512. Lind, Dan. Fung. 480. Died. 792. Mig. 543. *Naemospora bellula* Preuss. Fung. Hoyersw. no. 33.

Pustules conical, raising the epidermis. Stroma simple, forming in the middle a large conical dark-coloured columella, which is composed mainly of plectenchyma. Spores oblong-cylindrical, slightly tapering at the ends, hyaline, $8–13 \times 2–3\mu$ ($13–16 \times 4\mu$, Lind); sporophores filiform, eseptate, often forked.

On twigs of *Alnus glutinosa*. Cwm Dwr, Brecon (Grove & Rhodes). May.

Germ. Denm.

Aucuba

Myxosporium Aucubae, sp. nov.

Pustules aggregated, prominent, $300–400\mu$ diam., raising the epidermis convexly, black. Spores oblong, rounded at both ends, continuous, colourless, eguttulate, but finely granular within, with a thin wall (not 1μ thick), $18–28 \times 8–9\mu$; sporophores oblong-linear, $\pm$ obtuse above, about as long as the spore, and half as wide, rising from a thick, dark olive-brown, indistinctly cellular stratum.

On twigs of *Aucuba japonica*. Oscott College (Rhodes). Hadzor; Edgbaston Botanic Gardens, Birmingham.

May, Sept.

Carpinus

Myxosporium Carpini Grove. *M. carneum*, var. *Carpini* Grove, in Journ. Bot. 1918, p. 321, pl. 550, f. 13. See Tulasne, Carp. ii. 125, pl. 24, f. 17 (under *Melanconis chrysostroma*). ? *M. Carpini* Peck,

in Bull. New York Sta. Mus. 1910, p. 34 (spores 8–12 × 3·5–4 μ). Sacc. Syll. xxv. 561.

Pustules immersed, then erumpent by a slit, conico-truncate, somewhat rose-coloured, 300–500 μ diam. Spores oblong-ellipsoid, rounded at both ends, faintly curved in profile, usually with two large guttules, not granular within, singly colourless, 13–15 × 4·5–5 μ, issuing in flesh-coloured tendrils; sporophores densely crowded, acicular or subulate, about as long as the spore or shorter, 1·5–2 μ thick at base, rising from a dense olivaceous stratum. (Fig. 99 *a*.)

On twigs of *Carpinus Betulus*. Tanworth-in-Arden (Bayliss Elliott)!

The secondary pycnidial stage of *Melanconis xanthostroma* (Mont.) Schröt. = *Melanconiella chrysostroma* Sacc. The two large guttules give these spores a very striking appearance; Tulasne's is an exact figure (*l.c.*). The other pycnidial stage is *Melanconium ramulorum* Raben., *q.v.* p. 314.

Europe, ? U.S.A.

Myxosporium deplanatum Sacc. in Mich. ii. 354; Syll. iii. 725. All. vii. 515. Died. 793 (and 317). *Didymosporium deplanatum* Lib.

Pustules loosely gregarious, covered by the bark, then erumpent, flat, olive-coloured, with a black border, rather thick, up to 2 mm. across; texture of the evanescent wall small-celled, indistinct. Spores cylindric-ellipsoid, rather obtuse at the ends, occasionally curved, usually biguttulate, continuous, hyaline, 10–12 × 2·5 μ (10–14 × 3–4 μ, and sometimes at length 1-septate, Died.).

On dead twigs of *Carpinus Betulus*, Hadzor Hall, Ws. (Rhodes). May.

These specimens were on very thin twigs; there was no sign of a septum and the spores were very faintly clouded but quite colourless. They are a second pycnidial stage of *Melanconiella spodiaea* Sacc. in addition to *Melanconium stromaticum* Corda, *q.v.* p. 314. See Tul. Carp. ii. 127, pl. 24, f. 13, and cf. Vol. I, p. 247.

Fr. Germ. Ardennes, Denm.

Cornus

Myxosporium Corni Allesch. in Hedwig. 1894, p. 73. Sacc. Syll. xi. 568. All. vii. 516. *Myxofusicoccum Corni* Died. 317.

Pustules gregarious, conical, raising the epidermis, with

many thick brown and thin hyaline columellas within. Spores 10–14 × 4·5–5μ.

On branches of *Cornus sanguinea*. Seaton, Devon. Apr.

Germ. Denm.

Corylus

Myxosporium griseum Sacc. Syll. iii. 726. All. vii. 518. Died. p. 795, p. 770, f. 15. *Cytospora grisea* Pers. Syn. 110. Corda, Ic. iii. f. 68. *Naemospora grisea* (Fr.) Desm. in Ann. Sci. Nat. 1830, xix. 278. *Cryptosporiopsis grisea* Petr.

Pustules immersed, depressed-conical, 300–400μ diam., rather large and fleshy, whitish or pallid-grey. Spores oblong-ovoid or oblong, rounded at both ends, very granular within or with a central guttule, 20–25 × 8–9μ; sporophores clavate or filiform, "somewhat branched" (Died.), continuous, hyaline, rising from a thick yellowish-sooty-brown basal stratum.

On dead branches of *Corylus Avellana*. Hunt's Cross, near Liverpool (Ellis). Yorkshire; Surrey; Hatton, Wk.; Weatheroak and King's Norton, Ws. May.

The sporophores are at first as thick as the young spore and about as long; afterwards they become thinner and longer; I have not seen them branched. The spores are very similar to those of *M. Roumegueri*, f. *coryleum*, which may be the same thing.

Germ. Denm. Bohem. Hung.

Dracaena

Myxosporium dracaenicola B. & Br. in Ann. Nat. Hist. 1881, vii. 129. Sacc. Syll. iii. 728.

Pustules orange. Spores ovoid, subhyaline, 8·5 × 5μ.

On leaves of cultivated *Dracaenae*. *n.v.* A doubtful species.

"On the same leaves, scattered in the form of minute black specks, was a Diplodia with oblong uniseptate spores, slightly constricted in the middle, colourless and probably immature, 15–17·5μ long. These [two parasites] are doubtless states of more perfect fungi, but are mentioned here because they are connected with a disease which seems fatal to *Dracaenae*" (B. & Br.). See *Ascochyta dracaenicola* (Vol. I, p. 323), and *Phyllosticta Draconis* (*ibid.* p. 54).

Fagus

Myxosporium croceum Link, Sp. Pl. Fung. ii. 99. Corda, Ic. i, f. 6. Sacc. Syll. iii. 727. All. vii. 520. Mig. 545. *Naemospora crocea* Desm. in Ann. Sci. Nat. 1830, xix. 273, pl. 5, f. 3 (*non* Sacc.).

"Pustules erumpent or naked, orange, shining. Spores subrotund, of the same colour, conglutinate with mucus,

granular within, 20–24μ diam., issuing in crowded irregular saffron-yellow tendrils."

On fallen trunks and branches of *Fagus silvatica*. Recorded from Carlisle; Scarborough; Worcestershire, etc.

Said to be common, but all the specimens I have seen under this name, if they were mature, proved to be *Libertella faginea*. It is doubtful if the species, as described, really exists; it seems to be the result of some misconception.

Fr. Holl. Austr. Ital. Port. S. Amer.

Fraxinus

Myxosporium sticticum Grove, in Journ. Bot. 1922, p. 146. *M. carneum*, *β sticticum* Karst. Symb. xv. p. 159. Sacc. Syll. iii. 726. All. vii. 520. Mig. 545.

Pustules small (about 300μ diam.), roundish, scattered, somewhat convex, long covered by the periderm, but at length splitting it, yellowish within, surrounded by a darker line. Spores oblong or fusoid-oblong, at times inequilateral, obtuse at both ends or subacute below, granular or irregularly guttulate, 9–12 × 2–3μ; sporophores oblong-linear, densely fasciculate, colourless, about 15–20 × 2·5–3μ.

On dead twigs of *Fraxinus excelsior*. Quinton, Ws. Apr.

Bavaria, Denm. Finland.

Ilex

Myxosporium Nielianum Karst. & Roum. in Rev. Mycol. 1890, p. 128. Sacc. Syll. x. 464. All. vii. 522. *Gloeosporium Aquifolii* Penz. & Sacc. var. *ramulorum* Ellis, *in litt.*

Pustules rather gregarious, depressed, 1–2 mm. broad, covered by the epidermis which is at length variously cleft and at times blackened, surrounded by a circular or flexuous black line. Spores oblong or subellipsoid, biguttulate, 6–9 × 2–3μ; sporophores very short.

On dead branches of *Ilex Aquifolium*. Eastham Wood, Cheshire (Ellis). June.

One could easily believe this to be a form of *Phomopsis crustosa* Trav., except for the short sporophores.

Fr.

Platanus

Myxosporium platysporum, nov. comb. *Discella platyspora* B. & Br. in Ann. Nat. Hist. 1850, v. 378. Cooke, Handb. 463. *Discula platyspora* Sacc. Syll. iii. 674. All. vii. 410.

Pustules below the bark, then erumpent by bursting it. Spores oblong or somewhat clavate, obtuse at the ends, very granular within, yellowish in mass, $30–35 \times 10–12\mu$; sporophores short and simple, often falling off with the spore.

On dead twigs of *Platanus*. Batheaston (Broome). Feb.

On examination of these specimens of Berkeley and Broome there is seen to be no pycnidium whatever, merely an erumpent pustule; they might well be a form of *M. Roumegueri*.
Holl.

Myxosporium valsoideum All. vii. 524, with fig. *Gloeosporium valsoideum* Sacc. Syll. iii. 716; Fung. Ital. pl. 1048. *Hymenula ramulorum* Passer. Anc. della Nebb. d. Gelsi, p. 3.

"Pustules scattered, erumpent, reddish, 0·75–1 mm. diam., surrounded by the torn epidermis; disc rugulose. Spores very abundant, ovoid or oblong-ovoid, nearly hyaline, $10–20 \times 4\mu$."

On young twigs of *Platanus occidentalis*. Kew Gardens. May.

Attacking young plants, which it killed. The spores, which are frequently somewhat fusoid and gently curved, ooze out in large quantities and form a flesh-coloured globule over the disc. Different in general appearance, though not in its essential characters, from *Gloeosporium nervisequum*, of which, presumably with truth, it is said by Klebahn to be a form. See p. 219, *supra*.
Ital.

Polygonum

Myxosporium Polygoni Grove, in Journ. Bot. 1918, p. 340, pl. 550, f. 12.

Pustules scattered, subepidermal, oblong-convex, about 500μ long, blackish, bursting the epidermis in various ways. Spores large, ovoid-oblong, thick-walled, very granular within, often with a large subcentral guttule, broadly rounded at the apex, subapiculate at the base, colourless, 20–25 (or even 30) $\times 7–10\mu$; sporophores oblong, irregular, occasionally curved, very obtuse above, $20–24 \times 3–5\mu$.

On dry stems of *Polygonum cuspidatum*, Edgbaston Botanic Gardens, Birmingham, accompanied by *Phoma anceps*, var. *Polygoni* Gr. On dead stems of *P. sachalinense*, Sutton Coldfield.

This is very similar to *M. Roumegueri*; possibly it is part of the life-cycle of the Diaporthe which occurred on the same plants.

Pyrus

Myxosporium Mali Bres. in Hedwig. 1897, p. 382. Sacc. Syll. xiv. 1015. All. vii. 523. Mig. 546. ? *Sclerophoma Mali* Syd. in Ann. Mycol. ix. 146. Died. 280.

Pustules covered by the epidermis, which they afterwards burst, then free, roundish or oblong, 0·5–1 mm. broad, pallid, when dry black. Spores ovoid-oblong, hyaline, $8–11 \times 2{\cdot}5–3\mu$ ($3–4\mu$, Mig.).

On dry branches of *Pyrus Malus*. Long Ashton, near Bristol. Feb.

The specimens from this locality which I have seen seemed to me to be merely a form of *Phomopsis*. It is also suggested, in Bull. Soc. Roy. Bot. Belg. 1921, liv. 109, that this *Myxosporium* (and *Aposphaeria Pomi* S. & S.) are variant forms of *Fusicoccum Malorum* Oud., and therefore of *Phomopsis perniciosa*, *q.v.* Vol. I, p. 214.

Germ.

Myxosporium corticola Edgerton, in Ann. Mycol. 1908, vi. 51, f. 1, 2. Sacc. Syll. xxii. 1195. Stevens, p. 546, f. 368. Gilchrist, in T.B.M.S. 1923, viii. 230–42. Grove, in Journ. Bot. 1922, p. 145. *Macrophoma malorum* Paddock (*non* Berl. & Vogl.). *Cryptosporiopsis Pyri* Petr. in Ann. Mycol. xxi. 186.

Pustules erumpent, originating under several layers of cortex, 1–2 mm. diam., scattered over the diseased area. Spores cylindric-oblong, straight or curved, colourless, but often very densely granular, rounded at both ends, $18–32 \times 6–9\mu$ ($25–45 \times 9–18\mu$, Gilchrist, p. 235), oozing out in creamy-white tendrils; sporophores oblong, up to half as long as the spore, rising from a greenish-yellow parenchymatous stratum.

On branches of *Pyrus communis*, *Pyrus Malus*; said also to grow on Plum. Not uncommon: Sussex; Somerset; Devon; Cambridgeshire; Worcestershire; Hereford; etc.

The pycnidial stage of *Pezicula corticola* Nannfeldt (*Neofabraea corticola* Jörg. = *Dermatea corticola* Arn.).

This disease was discovered in New York State in 1898; it caused a canker of the bark, and was at first named *Macrophoma malorum* B. & V. (= *Diplodia malorum* Fckl.), but the spores remained always colourless, and there is no pycnidial wall. See N.Y. Agr. Exp. Station, Bull. 163, 191. It seems to have been first noticed in England, at Long Ashton, in 1920. Cf. also *Myxosporium Mali* Bres. which has much smaller spores, but specimens can be found with spores of the intermediate sizes. See also *Gloeosporium mali-corticis* Cordl. *supra*, p. 222.

U.S.A.

Myxosporium Lanceola Sacc. & Roum. Rel. Myc. Lib. iv. 168, pl. 45, f. 48; and in Rev. Mycol. 1884, p. 36. Sacc. Syll. iii. 726. All. vii. 513, with fig. Ellis, in T.B.M.S. v. 230. Mig. p. 543, pl. 74, f. 1–5.

Pustules gregarious, immersed, then erumpent, convexly pulvinate, about 1 mm. diam., somewhat flesh-coloured, bordered with brown and furnished with a pallid disc. Spores fusoid, pointed at both ends and especially at the upper end, straight or slightly bent, with a row of minute granules within or with a faint septum, colourless, $17–20 \times 2–3\mu$ ($20–22 \times 4\mu$, Sacc.; $15–24 \times 2{\cdot}5–3\mu$, Ellis); sporophores linear, about half as long or rather more. (Fig. 99*d*, p. 245.)

On twigs and small branches of *Quercus* spp. Swansea and Cheshire (Ellis). Ayrshire (Boyd). King's Lynn; Richmond Park; etc. (E. W. Mason). Cornwall (Rilstone). Monk Wood, Ws. May–Sept.

This is one of the many forms of *Fusicoccum quercinum*, i.e. it belongs to *Diaporthe leiphaemia*. It is recorded abroad on *Betula* also, but no doubt incorrectly, for it is similar to *Cytodiplospora Betulae* Oud. (See Vol. I, p. 344.)

Fr. Germ. Holl. Denm.

Myxosporium Marchandianum Sacc. & Roum. in Rev. Mycol. 1884, p. 36, pl. 46, f. 54. Sacc. Syll. iii. 725. All. vii. 517, with fig. Died. 794. Mig. 544.

Var. **quercinum** S. & R. *l.c.*

Pustules gregarious, immersed, then erumpent, about 1 mm. broad, externally fuscous, dingy rose-colour within. Spores ellipsoid, rounded at the ends, rather thick-walled, granular within, $12–14 \times 3\mu$.

On twigs of *Quercus Robur*. Sketty Park, Swansea (Ellis). Sept.

This var. seems to be merely a form of *M. Lanceola*. Roumeguère (no. 6286) gives the spores as $10 \times 3–4\mu$. The type of *M. Marchandianum* was on *Corylus*.

Fr. Germ.

Myxosporium Taleola Sacc. Syll. iii. 726. All. vii. 527. Mig. 547.

Pustules circular, rather flat, fleshy, pink within. Spores

elliptic-ovoid, rather obtuse at both ends, mostly straight, about $16 \times 8 \mu$.

On branches of *Quercus*. Not uncommon.

This is what Fuckel called the "macro-conidia" of *Diaporthe Taleola* Sacc. Cf. Fuckel, Symb. Myc. Nachtr. I, p. 312. It is like a Fusicoccum without peridium.

With these spores generally occur more slender spores which are placed under *Libertella Taleola*, *q.v.* p. 306.

Germ.

Rhus

Myxosporium typhinae, sp. nov.

Pustules scattered, convex, covered, then bursting the epidermis above in a stellate fashion, black outside, white within. Spores oblong-obovoid, rounded above, thick-walled, very oily-granular within, $22–25 \times 8–9 \mu$.

On stems of *Rhus typhina*. Heythrop Park, Oxon. June.

M. Rhois Sacc. (Syll. iii. 723), is similar but has different spores ($13–15 \times 3{\cdot}7–4 \mu$); spores of *M. rhoinum* Hollós (Syll. xxii. 1194), $23–32 \times 12–14 \mu$.

Rosa

Myxosporium Rosae Fckl. Symb. Myc. 399. Sacc. Syll. iii. 723. All. vii. 528. *Myxofusicoccum Rosae* Died. 319.

Pustules (or stromata) rather large, black, subconical, at first covered, then erumpent, up to 500μ diam., surrounded by the burst epidermis. Spores oblong-ovoid, straight or slightly curved, hyaline, $12 \times 4 \mu$, Fckl. ($8–10 \times 3–4 \mu$, Died.); no sporophores visible.

On dry branches of *Rosa*, wild and cultivated, Harpenden. On an old stem of a cultivated Rose, Edgbaston. May.

Germ.

Rubus

Myxosporium phaeosorum All. vii. 529, with fig. Died. 800. Mig. p. 548, pl. 75, f. 1–4. *Gloeosporium phaeosorum* Sacc. in Mich. i. 260; Syll. iii. 715; Fung. Ital. pl. 1038. *Discosporiella phaeosora* Petr. Myk. Notiz. v. no. 193, in Ann. Mycol. xxi. 14, 125.

Pustules gregarious, covered by the epidermis, globose or oblong, about 250μ diam., blackish, at length irregularly erumpent. Spores fusoid, rarely oblong, pale greenish-yellow, granular within, $25–28 \times 8 \mu$; sporophores filiform, short, sometimes forked.

On branches of *Rubus idaeus* (cult.). Sutton Coldfield, Wk. Sept.

The pycnidial stage of *Pezicula Rubi* Niessl = *Scleroderris Rubi* Mass. = *Dermatea rhabarbarina* Phill. Abroad it is recorded on *Rubus fruticosus* and on *Rosa* also.

Fr. Germ. Moravia.

Salix

Myxosporium melanotrichum Sacc. Syll. x. 465. All. vii. 531. Died. 800.

Pustules more or less thickly crowded, covered, then raising the blackened epidermis in a conical or convex manner, up to 500μ wide. Spores oval or ellipsoid, somewhat acute at the ends, usually straight, colourless, eguttulate, 5–6 (or 7) $\times$ 1–2μ; sporophores linear-papilliform, obtuse, colourless, rather broader than the spore and nearly twice as long, rising from a dusky-olive filamentous stratum.

On twigs of *Salix alba*. Rose Hill Grounds, Rednal, Worcs. Dec.–Apr.

Cf. *Discula microsperma* Sacc. (*supra*, p. 128) which Diedicke says appears to be the same species; it is not a good Myxosporium.

Germ.

Myxosporium scutellatum v. Höhn. in Sitzb. Akad. Wiss. Wien, 1906, cxv. 678. Petrak, in Ann. Mycol. 1920, xviii. 128. *Sphaeropsis scutellata* Otth, in Mittheil. Bern. 1868, p. 60. *Macrophoma scutellata* Sacc. Syll. xi. 496. *Cryptosporiopsis scutellata* Petrak, in Hedwig, 1921, lxii. 315. *C. nigra* Bub. & Kab. in Hedwig. 1912, lii. 361. See also Ann. Mycol. 1923, xxi. 185. *Cystosporiopsis* (*sic! ex errore calami!*) *nigra* Mig. 613.

Pustules immersed, then erumpent, discoid, 1–2 mm. broad. Spores oblong-ellipsoid, rounded above, less so below, 30–50 $\times$ 13–16μ, hyaline, guttulate, continuous, at length 2–3-septate when mature, issuing as whitish tendrils which ultimately become darker; sporophores oblong, about as long as the spore, branched below.

On branches of *Salix fragilis*. Oxford (Baxter). Jedburgh (Jerdon). Beauly, Scotland (Alcock). Also found on *Populus*.

The pycnidial stage of *Ocellaria ocellata* Schröt., with which it is frequently intermixed. Tulasne figured it in Carp. iii. 129, pl. 18, f. 1–4, 8, under *Stictis ocellata*. See also Phill. Discom. p. 374, where it is described as the pycnidium of *Propolis Lecanora* de Not.

Fr. Germ. Austr. Finland.

Another fungus which is possibly a Myxosporium, on rods of *Salix* (Basket-Willow), is described by Nattrass from Long Ashton, Somerset, in T.B.M.S. 1928, xiii. 286–304. He calls it a Gloeosporium, but does not give it a specific name, for he considers it only as a part of the life-history of an ascomycete. This latter he is inclined to assign to the Japanese *Physalospora Miyabeana* Fukushi, although it is not unlike *P. Salicis* Fckl. The coelomycete is described as follows:

Pustules 300–700μ diam., sometimes confluent and often arranged concentrically. Spores cylindric-ovoid, straight or slightly curved, rounded above, often tapering below, singly hyaline but often tending to be pale-pink in mass, eseptate but frequently slightly narrowed in the centre, 12·5–21·5 × 4–7μ (average 17·5 × 6·5); sporophores filiform, stout, flexuous, 25–35 × 3·5–5μ.

On leaves and rods of *Salix alba* and other species.

It seems to be not unlike *Septomyxa Salicis* Grove, if the slight constriction of the spores may be regarded as an indication of a coming septum. See also T.B.M.S. 1931, xvi. 76.

Sorbus

Myxosporium diplodioides Allesch. in Ber. Bayer. Bot. Ges. iv. 37. Sacc. Syll. xiv. 1014. All. vii. 532. Died. 801. Mig. 548. *Cryptosporiopsis diplodioides* Petr.

Pustules scattered, very variable, bursting the epidermis and then surrounded by its laciniae, up to 1 mm. broad, with a greyish-fuliginous stroma, whitish within, which extends below and above the spore-mass. Spores ovate-oblong, rounded above, with a little appendage below, colourless, somewhat cloudy or guttulate within, 20–30 × 9–11μ; sporophores fasciculate, linear-subulate, 14–18 × 3–5μ.

On dead branches of *Sorbus Aucuparia*, Oscott College, Birmingham (Rhodes). On *S. Aria*, Bembridge, Isle of Wight. June.

Germ. (on *S. Aria*).

CRYPTOSPORIOPSIS Bub. & Kab. in Hedwig. 1912, lii. 360.

Pustules subcutaneous, lenticular, black, pseudoparenchymatous below, consisting above of uniseriate hyphae vertically arranged, dehiscing rimosely. Spores oblong or cylindrical,

acrogenous, rather large, thick-walled, continuous, hyaline; sporophores emerging from vertical hyphae, hyaline, ± nodulose.

Too closely allied to Gloeosporium and Myxosporium; most of the British species placed in it by Petrak and others have been already included above under Myxosporium, but the following species on Populus will be added here because it seems to be different from the others. Cf. Patellina, *supra*, p. 131.

Populus

Cryptosporiopsis fasciculata Petr. in Ann. Mycol. 1923, xxi. 187. *Tubercularia fasciculata* Tode, Fung. Meckl. i. 20, pl. 4, f. 32 = *sec.* Tul. *Pezicula carpinea* (Pers.) Tul. in Ann. Sci. Nat. ser. 3, xx. 144. *Tuberculariella* v. Höhn.

Stroma erumpent, surrounded by the laciniae of the periderm, grey or reddish-brown, tubercularioid. Spores variable, ellipsoid, cylindric-oblong, or subovoid, rounded above, slightly tapering below, ± straight, hyaline, $16–25 \times 9–11\mu$ (if ovoid), $30–50 \times 9–12\mu$ (if cylindrical), issuing in whitish clumps; sporophores stout, brown at the apex, $100 \times 2–2·5\mu$.

On branches of *Populus*.

ACHROÖMYCES Bon. Handb. p. 135.

Stroma gelatinous, swollen, immersed, then erumpent.

This is a genus apparently allied to the Tremellineae, growing on bark, erumpent, and simulating a Myxosporium. But it is distinguished essentially from that genus by its very long and branched sporiferous hyphae, although their spores are not unlike; moreover the spore-mass, when soaked in water, swells up enormously and becomes tremelloid. See Journ. Bot. 1922, p. 170. It is included here (? wrongly) because it has been so often reckoned with Myxosporium, but it is nearer, I think, to *Hainesia Rubi*, *supra*, p. 204.

Alnus

Achroömyces tumidus Bon. Handb. p. 135, f. 231 (1851). *Myxosporium tumidum* Sacc. Syll. iii. 727 (1884). All. vii. 514, with fig. Died. 792. Mig. p. 543, pl. 74, f. 6–9.

Pustules whitish, somewhat fleshy, depressed, first covered by the epidermis, then bursting it and surrounded by its laciniae, 2 mm. thick. Spores cylindrical, rounded at both

ends, bent or curved, hyaline, with a row of two or three oil-guttules, 16–20 × 2–3·5 μ; sporophores elongated, fasciculate, septate, repeatedly branched, rounded or later pointed at the apex, rising from a small-celled basal stratum.

On branches of *Alnus glutinosa*. Heythrop Park, Oxon. (Rhodes & Grove). June.

Recorded abroad on *Betula* also.
Germ.

Carpinus

Achroömyces carpineus Grove, in Journ. Bot. 1922, p. 170, pl. 563, f. 16.

Pustules whitish when moist, then orange-yellow, pulvinate, 0·5–1·5 mm. diam., swelling up enormously when wet, surrounded by the laciniae of the bark; basal stratum dark-coloured, the proliferous stratum yellowish, composed of very numerous long fasciculate much-branched guttulate or oily hyphae, the branches about 2·5 μ diam., ascending, seldom dichotomous, obtuse or acute at apex, bearing the spores terminally and laterally. Spores very various, roundish, oval, or oblong, straight or rarely curvulous, seldom guttulate, obtuse at the ends, up to 7–8 × 2·5–3 μ. (Fig. 100.)

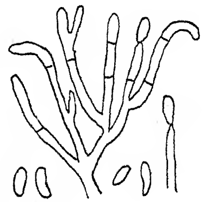

Fig. 100. *Achroömyces carpineus*: spores and mycelium, × 600.

On dead branches of *Carpinus Betulus*. Edgbaston. Apr.

The spore-mass is black when dry. Mixed with these pustules were smaller ones in which the colourless spores were acute at the ends, subfusoid, 6–7 × 2 μ; sporophores narrower, less branched, more guttulate, and acute at the ends. They reminded one of a Phomopsis, but these pustules, like the others, had no pycnidial wall.

Tilia

Achroömyces pubescens Riess, in Bot. Zeit. 1853, p. 136, pl. 3, f. 21–3. *Myxosporium pubescens* Sacc. Syll. x. 465. All. vii. 532. Mig. 549. *Achr. Tiliae* v. Höhn. in Ann. Mycol. 1904, ii. 271–3.

Pustules roundish, pallid, pulvinate. Spores obtuse, straight or slightly bent, mostly filled with guttules; sporophores (?) one-celled, in the mature fungus somewhat projecting like hairs.

On dead bark of *Tilia*. West Kilbride, Ayrshire (Boyd). May.

The size of the spores is not given by the earlier authorities. In Mr Boyd's specimens they are oblong, rounded at the ends, full of small guttules, and measuring about $15 \times 7\,\mu$; projecting filaments not present. This is no doubt *Achroömyces nigrescens* Fr., which = *Platygloea nigricans* Schröt, and may belong to *Stictis Betuli*, var. *nigrescens* Fr., on *Tilia*.

NAEMOSPORA Pers. Obs. 81; Syn. Fung. 109 (emend. Sacc. in Mich. ii. 12).

Pustules on twigs and branches, resembling those of Myxosporium, but more variable, long covered by the periderm, bright-coloured (white, yellow, orange), soft, often somewhat gelatinous. Spores sausage-shaped, small, continuous, colourless except in mass, at length oozing out in bright-coloured masses or tendrils; sporophores various, short, often branched.

This genus might almost be compared with a Cytospora devoid of any definite pycnidial wall. Both it and the similar but longer-spored Libertella constitute what have been often called the "spermatia" of Pyrenomycetes. They have been the source in the past of much fogginess of statement which even now is hardly beginning to be dissipated. There is abundant evidence that in some way Naemospora is an accompaniment of Libertella (see Tulasne, Carp. vol. ii), but to unite them as yet would be premature.

Plurivorous

Naemospora microspora Desm. in Ann. Sci. Nat. 1830, xix. 271, pl. 5, f. 1 (*saltem p.p.*). Tul. in Ann. Sci. Nat. 1856, v. 117. Cooke, Handb. 811. Sacc. Syll. iii. 747. All. vii. 537. Died. p. 804, p. 770, f. 20. Mig. 550. *Libertella betulina* Tul. *p.p.* (*non* Desm.).

Pustules small, roundish, covered, then raising the bark, generally confluent and extending sometimes for several inches, at length emerging by a small slit; proliferous stratum deeply marked with reticulated grooves, whitish before beginning to produce the spores, then bright golden-orange and showing (on *Fagus*) through the bark, when old blackish-grey. Spores subcylindrical, curvulous, $4–6 \times 1–1{\cdot}5\,\mu$, at length expelled in coarse orange tendrils; sporophores filiform, $24–28 \times 1–1{\cdot}25\,\mu$, occasionally branched. (Fig. 101*c*.)

On branches, Highgate and Mickleham; on bark of *Fagus*, Kew Gardens (Cooke). On branches, Sutton Coldfield. On dead *Quercus*, Ockeridge Wood and Halesowen, accompanied closely by its ascophorous stage. Common in Wyre Forest and the Forest of Dean. On *Betula*, Ockeridge Wood.

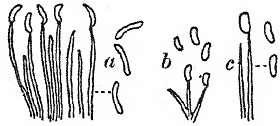

Fig. 101. *Naemospora*: *a*, *N. crocea*, on *Crataegus*; *b*, *N. Strobi*; *c*, *N. microspora*, on *Quercus*; spores and sporophores, all × 600.

The pycnidial stage of *Diatrype Stigma* Fr. It is recorded abroad also on *Alnus*, *Carpinus*, *Castanea*, *Prunus*, *Malus*, *Tilia*, etc.

Beautiful figures of the sporiferous stratum of this fungus will be seen in Tulasne, Carp. ii, pl. 6, f. 1, 2, on *Quercus*, under the name *Stictosphaeria Hoffmanni*.

It is not easy to see until the orange masses begin to exude; the pustules become confluent beneath the unbroken bark. Desmazières says that the spores are ovoid and about 4·5 μ long; I have met with such spores in conjunction with the narrow curved spores, but it is not known in what relation these two kinds stand to each other.

The pustules are often seated near to or actually upon the perithecial stroma. Some authors, e.g. Brefeld (Untersuch. x. 242) and Saccardo (Syll. i. 193) have apparently taken what are above called "sporophores" as another form of spore. But see *infra*, p. 304.

Europe, Siberia, N. America, Australia.

Naemospora crocea Sacc. Syll. iii. 747 (*nec* Desm. *nec* Pers.). All. vii. 539. Died. 806. Mig. p. 551, pl. 75, f. 13–15. ? Kew Bull. 1908, p. 269, with plate. Massee, Dis. Cult. Pl. 449. *Libertella crocea* Bon. Handb. p. 57, pl. 3, f. 63.

Pustules loosely gregarious under the periderm and showing through it, depressed-convex, somewhat tortuous, saffron-coloured, without a trace of peridium, at length erumpent by a star-shaped opening. Spores sausage-shaped, curvulous, 5–7 × 1–1·25 μ, exuding in long spiral orange tendrils; sporophores fasciculate, as long as the spore or longer. (Fig. 101 *a*.)

On shoots of *Prunus* (*domesticus, lusitanica, Persica*): Kew; Warwickshire; Carlisle; Ayrshire; etc. On hedge-cuttings of *Crataegus Oxyacantha*: Stevenston, Ayrshire (Boyd). Upton Warren, Worcs.; Yorkshire. Mar.–Jun.

In the Kew Bulletin (*l.c.*) a long account is given of the supposed action of the disease on *Prunus*; but it is an extraordinarily confused and doubtful species, and perhaps cannot be at all morphologically

distinguished from *N. microspora*. The article by Desmazières on this species in Ann. Sci. Nat. 1830, xix. 273–5, could be disregarded with advantage; the spores drawn there (fig. 3) look like mere oil-drops.

The Naemospora on *Crataegus*, recorded above, was in nearly all cases in company with what seemed to be *Libertella blepharis* Smith (*q.v.*) and with the spores of a kind resembling Cytospora (*C. Oxyacanthae* Rab.?). Some of the pustules, cut open when fresh, were of a notably brilliant orange colour, but those on young Peach and Plum trees seemed to be less brilliant. In some cases the two pustules, of the Naemospora and the Cytospora, were united together into a solid mass.

Holl. Germ.

Naemospora croceola Sacc. in Mich. ii. 120; Syll. iii. 746; Fung. Ital. pl. 1086. All. vii. 537, with fig. Died. 805. Grove, in Journ. Bot. 1922, p. 147.

Pustules scattered, immersed, then erumpent and surrounded by the laciniae of the bark, bright-orange in colour, pulvinate, somewhat lobed within. Spores sausage-shaped, $5–6 \times 1–1\cdot5\mu$ ($0\cdot75–1\mu$ wide, Sacc.), exuding in an amber-coloured gelatinous tendril or mass; sporophores verticillately branched, with acicular branches, $20–25 \times 0\cdot75\mu$, springing in fascicles from basal cells $3–3\cdot5\mu$ wide.

On dry twigs of *Acer Pseudoplatanus*, Harborne, Birmingham. On *Tilia*, Handsworth, near Birmingham. Nov. Dec.

Recorded abroad on dead branches of *Castanea*, *Fagus*, *Fraxinus*, and *Quercus*, also.

Fr. Holl. Germ.

Pinus

Naemospora Strobi Allesch. in Hedwig. 1895, p. 279; and in Raben. Krypt. Flor. vii. 540. Sacc. Syll. xiv. 1018. Elliott & Chance, in T.B.M.S. 1921, vii. 49. Mig. 551.

Pustules covered by the periderm which is at length irregularly torn, convex, often confluent, $200–300\mu$ diam., flesh-coloured or yellowish-white. Spores very numerous, sausage-shaped or cylindrical, obtuse at both ends, $2\cdot5–4 \times 1–2\mu$, exuding in cream-coloured tendrils; sporophores densely fasciculate, verticillately branched, colourless, acute, variable in length. (Fig. 101*b*.)

On twigs of *Pinus silvestris*. Oxshott Woods, Surrey; Sutton Park, near Birmingham. Dec. Jan.

Allescher gives the size of the spores as 2–2·5 × 0·5–1 μ; possibly his specimens, on *Pinus Strobus*, were less mature.

Germ.

Tilia

Naemospora Tiliae Delacr. in Bull. Soc. Myc. Fr. 1890, vi. 184, pl. 20, f. 7. Sacc. Syll. x. 507. All. vii. 542. *Sphaeria tiliaginea p.p.* Currey, in Phil. Trans. Roy. Soc. Lond. 1857, cxlvii. 546, pl. 24, f. 11, pl. 25, f. 14.

Pustules small, convex, rather flat, greyish, covered by the periderm, 700–800 μ diam. Spores cylindrical, straight, obtuse at both ends, hyaline, 6–7 × 1 μ; sporophores filiform, crowded, long and slender, 20–30 (or more) × 0·75 μ.

On bark of *Tilia europaea*. ? Richmond Park (E. W. Mason). Oscott College. Apr.

Deemed to be the pycnidial stage of *Cryptodiaporthe hranicensis* Wehm. which grew with it.

Whether the Naemospora which occurred at Oscott in connexion with the Cryptodiaporthe is identical with that of Delacroix is uncertain, since no "long orange tendrils" such as he attributes to it were observed. The perithecia grow beneath the pycnidium and the ostioles protrude through it. See T.B.M.S. 1932, xvii. 288.

Fr.

The following suggestions, made by Tulasne in his famous *Carpologia*, deserve investigation:

Naemospora microspora Desm. (*non* Tul.) on *Fagus* is said to have spores 2–3 μ long and to belong to *Melogramma rubricosum* Fckl. = *Valsaria rubricosa* Sacc.

There is a Naemospora (unnamed) which produces brilliant golden-red tendrils on dead trunks of *Carpinus*, and is assigned by Tulasne to his *Eutypa decipiens* = *Anthostoma decipiens* Nits.; spores 10–13 μ long or sometimes less than a third as long. See Tul. Carp. ii. 60, pl. 8, f. 1, 2. Another unnamed pycnidial stage on *Carpinus*, belonging to *Melogramma Bulliardi* Tul., has longer "spermatia", colourless and 16–25 μ long; this should rather be called a Libertella.

HYPODERMIUM Link, Sp. Pl. Fung. ii. 88.

Pustules subepidermal, then erumpent, often elongated, black. Spores oblong-ovoid, continuous, colourless, united in long chains, springing from an olivaceous parenchymatous basal proliferous layer.

Orchidaceae

Hypodermium Orchidearum Cooke & Mass. in Grevillea, xvi. 48 (1887). Sacc. Syll. x. 466. Massee, Dis. Cult. Pl. 448.

Pustules erumpent, linear or narrow-oblong, girt by the cleft epidermis. Spores cylindrical, rounded at both ends, granular within, 25–27 × 5 μ, produced in chains; sporophores short and thick.

On leaf of *Cymbidium eburneum*. Specimen in Herb. Kew, sent from the Gardeners' Chronicle, without locality. On leaf tips of *Cymbidium* in Anglesey.

I find the spores of the Kew specimen to be now oblong-fusoid, 17–20 × 5 μ, granular, frequently inequilateral, on very long sporophores, but they were not visibly in chains. The epidermis is raised and pale over the centre of each pustule, which is surrounded by a blackish line due to the olivaceous sporophores. Cf. *Colletotrichum cinctum*, *supra*, p. 230, and *Gloeosporium Orchidearum*, p. 218.

"Forms minute, blackish, elongated spots on the living leaves. The spots are arranged in groups, often extending for a distance of 1–2 inches, and at these points the leaf turns yellow and dies. When the spore-clusters burst through the epidermis, they are blackish owing to the dark-coloured fungus mycelium" (Massee, *l.c.*).

MYRIOCONIUM Syd. in Ann. Myc. x. 448.

Pustules subcutaneous, rounded or elongated, dehiscing by fissures, more or less erumpent, becoming hard when dry. Spores acrogenous, catenulate, minute, globose, hyaline, soon separating; sporophores fasciculate, often arranged in heads so as distantly to resemble the more aberrant species of *Penicillium*.

Scirpus

Myrioconium Scirpi Syd. in Ann. Mycol. 1912, x. 449, f. 1–7; Mycoth. Germ. no. 1136! Mig. p. 552, pl. 76, f. 1–7. Grove, in Journ. Bot. 1922, p. 146. *Sphacelia scirpicola* Ferdin. & Winge, in Ann. Mycol. xi. 21, with figs. *M. scirpicolum* Died. p. 810, p. 770, f. 22.

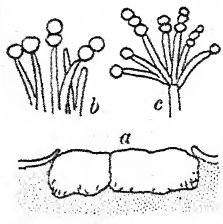

Fig. 102. *Myrioconium Scirpi*: *a*, section through two pustules, × 20; *b*, spores and sporophores, × 600; *c*, one of the "Penicillium"-like heads, × 500.

Pustules scattered or seriate, roundish or oblong, 0·5–1 mm. long, sometimes confluent, at first flat and completely covered by the darkened epidermis which is afterwards rimosely split, at length erumpent, when moist cinereous, when dry blackish, somewhat pseudolocellate within. Spores very numerous, globose, hyaline, 2–2·5 μ diam.,

formed in chains but easily separating; sporophores ± filiform, about $10 \times 2\mu$. (Fig. 102.)

On dead culms of *Scirpus lacustris*, Ashgrove Loch, Stevenston, and Kilwinning, Ayrshire (Boyd). Feb. Aug.

The spores are so numerous that their dense masses make it difficult to see the conidiophores, but after washing them gently away one perceives long delicate branched hyaline hyphae, on which crowded fascicles of conidiophores, forming spherical heads, are scattered here and there. Sydow compares these to *Penicillium*, but the comparison is inexact. Ferdinandsen & Winge (*l.c.*) would place this fungus among the Hyphomycetes as *Sphacelia scirpicola* (a stage of *Sclerotinia scirpicola* Rehm); it may be so, but its mode of growth seems to be rather that of the Melanconiales. Bubák & Sydow, in Ann. Mycol. 1915, xiii. 9, describe *Myr. maritimum* on culms of *Scirpus maritimus* in Germany, with conidia $3–3{\cdot}5 \times 2–2{\cdot}5\mu$, but otherwise similar.

Germ. Latvia.

BLENNORIA Fr. Syst. Myc. iii. 480.

Pustules discoid or pulvinate, erumpent. Spores cylindrical, truncate at the ends, colourless, united to form long chains; sporophores typically very long and much branched, giving off the spores at their apices, and rising from a dense colourless stromatic mass.

Petrak and Sydow (in Ann. Mycol. 1923, xxi. 352), having examined a specimen from Fries' own herbarium, give a slightly different account of the type-species, *B. Buxi* Fr. They ascribe to it a distinct stroma, composed of a number of loculi somewhat radially elongated, and apparently would range it among the Excipulaceae.

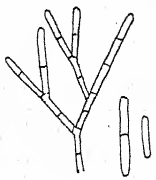

Fig. 103. *Blennoria Buxi*: spores and sporophores, ×600.

Buxus

Blennoria Buxi Fr. Syst. Myc. iii. 480. Sacc. in Mich. ii. 356; Syll. iii. 730; Fung. Ital. pl. 1092. All. vii. 546 with fig. Died. 811. Mig. p. 553, pl. 75, f. 16–19.

Pustules amphigenous, at length erumpent and surrounded by the laciniate epidermis, rather compact, fuscous, up to 1 mm. diam. Spores cylindrical, truncate at both ends, faintly biguttulate, hyaline,

10–15 × 2·5–3μ, forming long terminal chains; sporophores very long, filiform, repeatedly branched, mostly dichotomous, colourless, about 1·5μ diam. (Fig. 103.)

On fading leaves of *Buxus sempervirens*. Mickleham Downs (Bloom).

It is closely allied to Trullula; the spores exactly resemble those of Ceuthospora.

Fr. Belg. Germ. Macedonia.

TRULLULA Ces. in Bot. Zeit. 1852, p. 397.

Pustules produced under the epidermis, but soon erumpent, discoid, pulvinate, or depressed-conical, compact, black, and often having a pseudopycnidial wall. Spores oblong or cylindric, continuous, hyaline or (in *Trullula* proper) olivaceous, concatenate; sporophores long, filiform, densely fasciculate, simple or branched.

There are two allied genera (or subgenera): *Cesatia*, having hyaline spores and simple sporophores, and *Hormococcus*, with similar spores, but branched sporophores. *Bloxamia* also is a closely allied genus.

Plurivorous

Trullula olivascens Sacc. in Mich. i. 94; ii. 285; Syll. iii. 731. All. vii. 548, with fig. Died. p. 812, p. 770, f. 23. *Hormococcus olivascens* Sacc. Fung. Ital. pl. 91.

Pustules scattered or subgregarious, often circinate, immersed, then erumpent, conical-globose with flattened summit, at first mouthless, finally discoid, black; texture of basal stratum small-celled, ferruginous, paler within. Spores cylindrical, truncate at both ends, olivaceous, 3–6 × 1·5–2·5μ; sporophores densely crowded, filiform, simple or forked or branched, septate, hyaline, 25–30 × 1·75–2μ, bearing at their apices very long parallel chains of spores, 50–60 in a chain.

On dead twigs of *Ephedra andina*. Kew Gardens. May.

Recorded abroad on dead or decaying branches of many hosts, *Citrus*, *Laurus*, *Paliurus*, *Paulownia*, *Persica*, *Populus*, *Rubus*, *Vitis*, cone-scales of *Abies*, pods of *Robinia*, etc.

Germ. Ital. Denm. Argentina.

Trullula (Hormococcus) papillata Sacc. Syll. iii. 733. All. vii. 551. Died. 814. Mig. 556. Grove, in Journ. Bot. 1932, p. 6, pl. 599, f. 7. *Hormococcus papillatus* Preuss, in Linnaea, xxvi. 716.

Pustules erumpent, ovate, papillate or at first convex, horny, very black and shining, up to 500μ diam., then flat and patellate as the contents swell; when moistened these contents form a highly gelatinous and rose-coloured or sometimes nearly colourless mass, which bursts forth and assumes the shape of a disc. Spores exceedingly copious, cylindrical, occasionally faintly curved; very obtuse at both ends, continuous, singly colourless, biguttulate, 3·5–4 × 1μ, at first catenulate, springing from the apices of the pedicels; each pedicel repeatedly branched, elongated, filiform, eseptate,

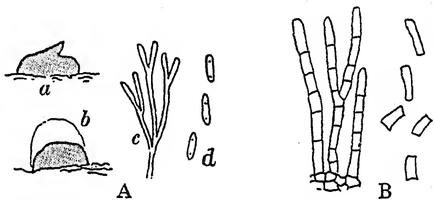

Fig. 104. *Trullula*: A, *T. papillata*; *a*, pustule, × 10; *b*, the same when swelled with moisture, × 10; *c*, sporophores (diagrammatic); *d*, spores, × 1000. B, *T. Silphii*, spores and sporophores, × 600.

colourless, densely fasciculate, up to 50 × 1–1·5μ, rising from a thick ruddy-olivaceous, minutely parenchymatous, basal stratum. (Fig. 104 A.)

On bleached decaying grass-culms, bits of wood and herbaceous stems, lying on the shore above high-water mark, mouth of the Alt, Lancs. (Travis). Sept.

Germ.

Silphium

Trullula (Cesatia) Silphii Grove, in Journ. Bot. 1922, p. 146, pl. 563, f. 13.

Pustules subepidermal, conico-erumpent, 250–500μ diam., blackish, at length crowned by an amber-coloured globule. Spores in long chains, shortly cylindrical, truncate at each end, obsoletely guttulate, singly hyaline, 5–7 × 2μ; sporophores crowded, cylindrical, palisade-like, colourless, rarely forked, 10–12 × 2μ, rising from a parenchymatous pale-olivaceous stratum. (Fig. 104 B.)

On dead stems of *Silphium perfoliatum*. Botanic Gardens, Edgbaston. Mar.

Allied apparently to *T. Spartii*, but the pustules could not be described as "very thin and membranous".

BLOXAMIA B. & Br. in Ann. Nat. Hist. 1854, xiii. 468.

Pustules small, almost superficial, flattened, with a wall which is dark-coloured and persistent below, but paler above and evanescent, therefore almost excipuliform. Spores quadrate, concatenate, produced within the sporophores which are cylindrical and densely crowded.

The genus somewhat resembles Myxormia B. & Br. (Crocicreas v. Höhn.) but it has not a distinct excipulum and the spore mass is superficial, not erumpent. See also Thecostroma (Clements, Genera of Fungi, 1909, pp. 135, 176) which is very similar.

Ulmus

Bloxamia truncata B. & Br. in Ann. Nat. Hist. 1854, xiii. 468, pl. 16, f. 17. Cooke, Handb. 934. Sacc. Syll. iii. 735. All. vii. 554, with fig. Lindau, Hyphom. ix. 818. Cf. *Trullula nitidula* Sacc., which is very like the Bloxamia.

"Pustules punctiform, often slightly elongated, depressed, with vertical sides, firmer below and persistent, extremely thin, pale, and evanescent above. Spores almost cuboid, catenulate, $3 \cdot 1 \times 2 \cdot 5\mu$; sporophores linear, densely fasciculate" (Berk.).

On dead branches of *Ulmus montana*. St Catherine's, near Batheaston (Broome). Feb.–Apr.

I have examined the original specimens collected by C. E. Broome. The pustules are on the wood, nearly superficial, flat, black, about 500μ diam. Each pustule is composed of a densely crowded layer of erect parallel brownish hyphae, which become darker upwards and again paler at the summit, about $2 \cdot 5\mu$ wide and the spore-bearing part $10–12\mu$ long.

The spores arise within the hyphae, and from short chains of usually 3–6 or even 8 spores. Each spore is perfectly hyaline, oblong-cuboid, with very truncate ends, and about $2 \cdot 5 \times 1 \cdot 5\mu$, i.e. now rather smaller than Berkeley's measurements. The chains then protrude from the open hyphae or sheaths, and break up into a nearly colour-

less layer or heap of loose spores. The fertile hyphae arise from a pallid felted mass of mycelial hyphae: they resemble the hymenium of a minute Peziza.

It seems to have been found near Bath by Mr Broome three times, in March 1852, April 1865, and February 1871. Saccardo no doubt is right in considering his *Trullula nitidula*, Fung. Ital. pl. 1096 (= *Bloxamia Saccardiana* Allesch.), from northern Italy to be very closely similar to Broome's Bloxamia. If it is not identical with *B. Saccardiana*, no one else has met with it except von Höhnel, who states (in Ann. Mycol. i. 406) that it belongs to the Hyphomycetes (Tuberculariеae) and places it near the genus Hymenella Fr. This decision might seem to be contradicted by its evident relationship to Saccardo's species, unless that also were excluded from Trullula. Since, however, the spores of Bloxamia, which are of the kind called "endoconidia", seem to arise like the conidia of *Thielavia basicola* Zopf, by transverse septation of the hyphae, followed by a tangential splitting of the walls, the fungus must be a hyphomycete allied to the Chalareae.

Austr. Bosnia.

ACTINONEMA Fr. emend. Grove (in Journ. Bot. 1918, p. 343).

Pustules subcutaneous, at length erumpent, surrounded by and seated on radiating fibrils, minute, ± pulvinate. Spores oblong, 1-septate, shortly pedicellate.

As will be seen from the synonyms, this genus has been repeatedly misconstrued. It is closely allied to *Marssonina*, but is distinguished easily by the definite fibrillose subiculum.

Asterogloeum was a section of the genus Gloeosporium formed by Saccardo to include those species of the genus which were found to have radiating fibrils, but were not then known to have 1-septate spores.

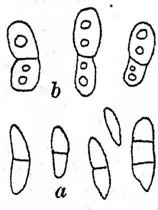

Fig. 105. *Actinonema*: *a*, *A. Aquilegiae*; *b*, *A. Rosae*; spores, × 600.

Aquilegia

Actinonema Aquilegiae Grove, in Journ. Bot. 1918, p. 343, pl. 550, f. 18. *Gloeosporium Aquilegiae* Thüm. Pilzfl. Sibir. no. 144. Sacc. Syll. iii. 700. *Phyllosticta Aquilegiae* Roum. & Pat. in Rev. Mycol. 1883, p. 28. *Ascochyta Aquilegiae* Sacc. Syll. iii. 396, *p.p.* All. vi. 630. Died. 376. Mig. 265. Von Höhn. in Ann. Mycol. iii. 406. *Phyllosticta aquilegiicola* Brun. Misc. Myc. ii. 33. Sacc. Syll. xi. 477. All. vi. 103. *Gloeosporium radiosum* Rost. in Bot. Tidsskr. 1899, p. 269. *G.* (*Asterogloeum*) *radiosum* Sacc. Syll. xvi. 1004. All. vii. 947. *Actinonema pallens* Sacc. &

Cav. in N. Giorn. Bot. Ital. 1900, vii. 301, f. II, 4. Sacc. Syll. xvi. 936. All. vii. 885. *Marssonina Aquilegiae* Lind, Dan. Fung. p. 485, pl. 8, f. 109–11 (1913). *Marssonia Aquilegiae* Dearn. in Fung. Manitoba, 1929, p. 134.

Spots chiefly visible above, whitish- or greyish-brown, with a narrow brown border, irregular, often roundish, 5 mm.–2 cm. diam.; fibrils white, epiphyllous, subcuticular, densely radiating, mostly branched dichotomously. Pustules numerous, epiphyllous, seated on the fibrils, pale yellowish-brown, at length darker, 50–100μ diam. Spores oblong, very irregular, sometimes curved or inequilateral, usually tapering at the base, seldom at both ends, hardly constricted, hyaline, indistinctly guttulate, at first continuous, about $8 \times 2\mu$, increasing gradually in size, then 1-septate, occasionally 2-septate, $15–17 \times 3–4\mu$ (rarely reaching to $20 \times 5\mu$), all within the same pustule, at length exuding as tendrils. (Fig. 105*a*.)

On living or fading leaves of *Aquilegia vulgaris*. Saltcoats, Ayrshire (Boyd). Kew Gardens; Hereford; Dorchester.

Jul. Aug.

The spots are covered with a whitish bloom (from the fibrils); the spores remain for a long time without a septum, and the biseptate spores are very rare. The leaf-tissue attacked by the fungus soon withers, becomes brittle and disappears, leaving "shot-holes". The true state of things can be seen only in well-preserved leaves.

Europe, N. Amer.

A very similar fungus is *Actinonema Actaeae* Allesch. in Ber. Bayer. Bot. Gesell. 1897, v. 7; Krypt. Flor. vi. 706 (= *Stagonosporopsis Actaeae* Died. in Ann. Mycol. x. 142 = *Marssonia Actaeae* Bres. in Hedwig. 1893, p. 33) on *Actaea* in Bavaria and U.S.A., while corresponding forms, varying in the length of the spores, occur on *Thalictrum* (*Actinonema Thalictri*) and on *Clematis*. Probably all these should be grouped under one name (see Davis, in Wiscons. Acad. xix. 698); in all of them fibrils will be found on examination.

Rosa

Actinonema Rosae Fr. Summ. Veg. Sc. 424. Sacc. Syll. iii. 408; Fung. Ital. pl. 1474. All. vi. 708, with fig. Stevens, p. 508, f. 351. *Asteroma Rosae* Lib. in Ann. Soc. Linn. 1826. Berk. in Ann. Nat. Hist. 1841, vi. 364, pl. 11, f. 5. Cooke, Handb. p. 461, f. 174 *a*. *Marsonia Rosae* Trail, in Scot. Nat. 1889, x. 73. Sacc. Syll. x. 477. All. vii. 608. Died. 830. Mig. 574.

Spots epiphyllous, purplish-brown; fibrils subcuticular, branched, radiating from the centre. Pustules epiphyllous,

seated on the fibrils, sometimes very abundant and crowded, but often few and scattered, rounded or linear, tuberculiform, irregular, collapsing, blackish. Spores oblong, constricted at the septum, $18–20 \times 5–6\mu$, cells often unequal; sporophores shorter. (Fig. 105*b*.)

On living leaves of wild and cultivated Roses, also lasting through the winter on evergreen Rose-leaves and on the wood of the young shoots of the previous summer. Very common wherever Roses are grown.

The spores consist of two obovate cells, attached by their broader ends; each cell often contains two guttules. The spores vary in size; in young specimens they may measure only $15 \times 4\mu$, in others $25 \times 8\mu$.

Wolf (in Bot. Gazette, 1912, liv. 231) shows that in the United States the fungus develops in April into an ascophorous stage, which he calls *Diplocarpon Rosae*. But this perfect stage does not seem to occur in Britain. Wolf could find no fungal tissue above the spore-layer, but this point is variable; sometimes there is a faint trace of such, but it is hardly a peridium, though it is enough to prove that a firm distinction between the Sphaeropsidales and the Melanconiales such as earlier authors have made is without justification. The difference in the amount of peridial covering depends often upon the firmness of the surrounding host tissue.

Europe, U.S.A. Canada, Australia.

Section Asterogloeum

Prunus

Actinonema Padi Fr. Summ. Veg. Scand. 424. Sacc. Syll. iii. 409. *Asteroma Padi* DC. Flor. fr. 1815, vi. 164. Grev. (*nomen nudum*) in Loud. Hort. Brit. 1830, p. 459. Berk. in Ann. Nat. Hist. 1841, vi. 364, pl. ii, f. 4 (bad). Cooke, Handb. p. 461, f. 174 *b*. Sacc. Syll. iii. 201; xvi. 890. All. in Hedwig. 1895, p. 262; Kr. Flor. vi. 470. Stevens, 496. *Asterogloeum Padi* Sacc. & Syd. Syll. xvi. 1004. *Actinonemella Padi* v. Höhn. Fragm. no. 961. *Gloeosporium Padi* Potebnia, Died. p. 784, p. 770, f. 12.

Spots epiphyllous, brownish-violet; fibrils immersed, branched, with fan-like expansions, radiating to a considerable distance, each traversed down the centre by a silvery line. Pustules subcuticular, ranged in two lines (one on each side of a fibril), crowded, $150–200\mu$ diam., brownish-red. Spores oblong, ovoid-oblong, or subcylindrical, variable, continuous, hyaline, $12–18 \times 3–4\mu$; "sporophores subulate, $15 \times 1{\cdot}5\mu$" (Died.).

On living leaves of *Prunus Padus*. Not uncommon in Scotland: Edinburgh; Tay; Dee; Moray; Inverness-shire; etc. Oct. Nov.

Since the spores have never yet been seen 1-septate, the species is placed in *Actinonema* only on account of its habit; but it is highly probable that a septum is at last formed, since the spores frequently have two guttules. The spots occupied by the fibrils remain green after the rest of the leaf has turned yellowish. Klebahn has proved (Zeitschr. f. Pflanzenkr. xviii. 129 and Ann. Mycol. viii. 75) that this fungus is the pycnidial stage of *Gnomonia padicola* Kleb. (=*Ophiognomonia Padi* Jaap). The ascophorous stage has been found abroad on several species of *Prunus* on fallen leaves which have passed the winter in the open. I have seen specimens of *Fusicladium Cerasi* Sacc. which, by their habit, suggested a connexion with this Actinonema.

Fr. Belg. Germ. Swed. Russia.

MARSSONINA Magnus, in Hedwig. 1906, xlv. 88.

Pustules small, mostly foliicolous, usually covered by the cuticle alone, rarely on twigs, remaining immersed for a long time. Spores ovoid or oblong, hyaline or nearly so, 1-septate, often unequally divided, rising from a thin pale-coloured proliferous stratum.

Originally Marsonia and afterwards Marssonia, the title was changed by P. Magnus (*l.c.*) because the previous name had been preoccupied by a phanerogamic genus. The name was given in honour of a German botanist, Marsson. The species serve as pycnidial stages for both Discomycetes and Pyrenomycetes, just as do those of Gloeosporium.

Acer

Marssonina truncatula Magn. *l.c.* Died. p. 824, p. 770, f. 32. *Marssonia truncatula* Sacc. in Mich. ii. 354; Syll. iii. 768; Fung. Ital. pl. 1064. All. vii. 595, with fig. Mig. p. 570, pl. 80, f. 1–5. *Didymosporium Aceris* Mont. (1849). *Ascochyta Aceris* Fckl. Symb. Myc. 387. *Marssonia acerina* Bres. *apud* All. & Schn. Fung. Bav. no. 689.

Spots at first brown, then ochraceous, varying in form. Pustules gregarious, epiphyllous, very small, roundish, flat, covered only by the cuticle, brownish. Spores oval when young, then obovoid or subcylindrical, truncate below, rounded above, at length 1-septate below the middle, the

upper loculus wider, each loculus often 1-guttulate, hyaline or clear-olivaceous, 8–10 × 3–4·5μ. (Fig. 106*a*.)

On living or fading leaves of *Acer campestre*. Box Hill, Surrey; Lady Wood, Worcestershire. Aug.

Also recorded in Germany on *Acer Negundo*. The spores, when free, are often sharply truncate at the base.

Europe.

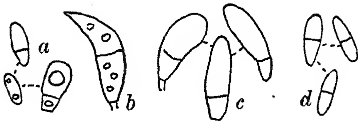

Fig. 106. *Marssonina*: *a*, *M. truncatula*, on *Acer*; *b*, *M. Potentillae*, on *Pot. reptans*; *c*, *M. Delastrei*, on *Lychnis*; *d*, *M. Sambuci*; spores, all × 600.

Aegopodium

Marssonina Aegopodii Sm. & Ramsb. in T.B.M.S. 1913, iv. 179 (as *Marssonia*) = ? *Ascochyta Podagrariae* Bres. in Hedwig. 1894, p. 207.

Spots suborbicular, solitary, sometimes confluent, pallid-fuscous. Pustules epiphyllous, convex, brownish. Spores oblong-ellipsoid, 1-septate below the middle, gently constricted, straight, 15–22 × 6–7μ.

On fading leaves of *Aegopodium Podagraria*. West Kilbride and Largs, Ayrshire; Rothesay, Bute (Boyd). *n.ex.*

Jul. Aug.

Arctium

Marssonina Lappae Sm. & Ramsb. in T.B.M.S. 1913, iv. 179 (as *Marssonia*).

Spots epiphyllous, solitary or confluent, nearly circular, brownish-cinereous. Pustules small, scattered, becoming tawny-brown. Spores somewhat oblong, straight or curvulous, 1-septate below the middle, 8–10 × 2μ.

On leaves of *Arctium Lappa*. Carradale, Kintyre, Argyll (Boyd). *n.ex.* July.

Betula

Marssonina Betulae Magn. *l.c.* Died. p. 826, p. 823, f. 1. *Leptothyrium Betulae* Lib. Crypt. II. 163. *Marssonia Betulae* Sacc. Syll. x. 477. T.B.M.S. iv. 179. All. vii. 597. Mig. p. 571, pl. 81, f. 5.

Spots irregular in form with a dentate margin, almost stellate, fuscous. Pustules subcuticular, epiphyllous, rather

flat, oblong or without definite form, sometimes confluent, dark-brown, wrinkled, at length circumscissile. Spores oblong, unequal-sided, rounded or subangular at the lower end, for a long time continuous, then 1-septate, not constricted, sometimes granular, $17–22 \times 8–10\mu$.

On dying leaves of *Betula*. West Kilbride, Ayrshire (Boyd). Dublin (O'Connor). Aug.

Probably the pycnidial stage of a *Pseudopeziza*.

I make the spores usually narrower than is stated, say $5–6\mu$ wide. This species is allied to *M. Castagnei* and *M. Populi*.

Germ. Denm.

Caryophyllaceae

Marssonina Delastrei Magn. *l.c.* Died. p. 825, p. 770, f. 28. *Gloeosporium Delastrei* Delacr. in Mont. Cent. Cell. II. 345. *Marssonia Delastrei* Sacc. in Mich. ii. 119; Syll. iii. 770; Fung. Ital. pl. 1066. All. vii. 596, with fig. Mig. p. 570, pl. 80, f. 6–8. T.B.M.S. iii. 39. Grove, in Journ. Bot. 1912, p. 53. *Gloeosporium Lychnidis* Oud. Aanw. i. 3. *Phragmosporonema Delastrei* Moss. & Smar.

Spots roundish or elongated, pale-yellowish, then pale-brownish, sometimes with a broad purple border, at other times unbordered. Pustules amphigenous, small, round, immersed, then wide open, yellowish. Spores clavate-pyriform, often inequilateral, variable, slightly curved, cloudy, at length 1-septate below the middle, $18–25 \times 5–6\mu$; sporophores half as long as the spore or less. (Fig. 106 *c*.)

On the leaves and stems of *Lychnis dioica*. Common: England, Scotland. On leaves and stems of *Silene inflata*, *S. maritima*: Pegwell Bay; Kew; Devizes; Alnwick. On Carnations, Wisley. Jul.–Oct.

The pycnidial stage of *Diplocarpon Agrostemmatis* Nannf. = *Pyrenopeziza Agrostemmatis* Fckl.

Recorded abroad on *Agrostemma*, *Viscaria*, etc. also. The spores ooze out as a white tendril. On young leaves I have found the earlier states of the fungus, where the spores were still non-septate; except for the sporophores it then exactly resembles *Gloeosporium Lychnidis* Oud. which is obviously the same species. On *Silene* the spots seem to be frequently paler and unbordered.

Europe, Siberia.

Daphne

Marssonina Daphnes Magn. *l.c.* Died. 826. *Septoria Daphnes* Desm. & R. in Ann. Sci. Nat. 1843, xix. 339. *Marssonia Daphnes* Sacc. Syll. iii. 769; Fung. Ital. pl. 1063. All. vii. 599. Smith, in

T.B.M.S. iii. 119. Mig. 572. *Gloeosporium Daphnes* Oud. Mat. Myc. Néerl. ii. 28, pl. 10, f. 14. See Gard. Chron. 1934, xcvi. 305, f. 123, 124.

Spots irregular, greenish, then brownish. Pustules amphigenous, scattered or gregarious, small, pallid. Spores ovoid or pyriform, somewhat curved, narrowed at each end, 1-septate toward the base, granular within, $12–20 \times 4–5\mu$; sporophores very short, pointed.

On fading leaves of *Daphne Mezereum*, Traquair, Peeblesshire (Boyd). Oct.

Europe.

Ipomaea

Marssonina Ipomaeae Magn. *l.c.* *Marssonia Ipomaeae* Cooke & Mass. in Grevill. xvi. 48. Sacc. Syll. x. 479. All. vii. 601.

"Pustules densely aggregated on the stems, erumpent, breaking the cuticle in an irregular manner, and becoming dark in colour so as to resemble an Uredo to the naked eye. Spores oozing out in short tendrils, narrow-oblong or subcylindrical, obtuse at both ends, 1-septate, hyaline, $10–15 \times 3\mu$" (C. & M.).

On living stems and leaves of *Ipomaea*. Kew Gardens. Oct.

An examination of the type specimen does not enable me to confirm this account. I think the structures described are not a fungus at all, but some kind of intumescence.

Juglans

Marssonina Juglandis Magn. *l.c.* Died. p. 828, p. 770, f. 29. *Leptothyrium Juglandis* Lib. Exs. no. 164. B. & Br. in Ann. Nat. Hist. 1875, xv. 33. Cooke, Handb. 423. *Marssonia Juglandis* Sacc. Syll. iii. 768; Fung. Ital. pl. 1065. All. vii. 602. Mig. p. 572, pl. 81, f. 1–4. Massee, Dis. Cult. Pl. ed. 2, p. 204. Stevens, Fung. Pl. Dis. 275. *Gloeosporium Juglandis* Desm. & Mont. in Ann. Sci. Nat. 1849, xii. 296.

Spots hypophyllous, large, circular or irregular, greyish-brown. Pustules flattened, minute, rugulose, brown. Spores fusoid, curved, somewhat beaked at the apex, rather unequally 1-septate, $20–25 \times 5\mu$.

On half-dead leaves and twigs of *Juglans regia*, and on the outside of green Walnut-fruits. Ayrshire (Boyd); Taymouth; Glamis. Also in many parts of England, but the spots are

often quite sterile; a form occurred at Bristol with larger spores. The spores on the fruits are like those on the leaves.

Autumn.

Klebahn proved (Zeitschr. f. Pflanzenkr. 1907, xvii. 223, and Centralbl. f. Bakter. 1905, xv. 336) that this is the pycnidial stage of *Gnomonia leptostyla* C. & de N., which occurs on the dead fallen leaves in spring. He also included in the life-cycle *Cryptosporium nigrum* Bon., *Leptothyrium Castaneae* var. *nucifoliae* Massal. and others, as microconidial forms.

Europe, N. Amer.

Lactuca

Marssonina Panattoniana Magn. *l.c.* Died. 828. *Marssonia Panattoniana* Berl. in Riv. Patol. Veget. 1895, iii. 342. Sacc. Syll. xiv. 1021. All. vii. 602. T.B.M.S. iv. 180.

Spots numerous, roundish, mostly 2–5 mm. diam. but often confluent, pale with a darker margin, often dropping out. Pustules gregarious, 100–150μ diam., at first covered, at length liberated by the breaking down of the epidermis. Spores obclavate, slightly curved in profile and even beaked, thinly septate near the middle, faintly granular, 12–15 (or even 17) $\times$ 3–4μ; sporophores short.

On living leaves of cultivated *Lactuca sativa*. Not uncommon in the south of England and elsewhere, but rarely epidemic as in Germany and U.S.A., except when the Lettuces are grown in greenhouses. First record in this country under glass in 1912, but in the open not till 1922, in Kent; see Journ. Ministr. Agric. 1923–4, xxx. 147.

It is possible that *Marssonina perforans* Ell. & Ev. in Ohio Agric. Exp. Sta. Bull. 73 (1896), p. 224, and Bull. 111 (1899), p. 12, is the same fungus; see Sacc. Syll. xxii. 1210 and 1306, and also Harpenden Reports, 1930–1. Dandeno (in 8th Rep. Mich. Acad. Sci. 1906, p. 45, f. 1–4) says that this fungus grows almost entirely on the surface of the leaves and is a Hyphomycete. He names it *Didymaria perforans* (see Syll. xxii. 1306), but it reminds one of Rhynchosporium rather than of Didymaria. See Chittenden in Journ. Roy. Hort. Soc. 1912, xxxvii. 541 ff.

Europe, U.S.A.

Melampyrum

Marssonina Melampyri Trail, in Scot. Nat. 1887, p. 89 (as *Marsonia*). Grevill. xv. 110. Sacc. Syll. x. 479. All. vii. 603.

Spots dark, ill-defined, becoming nearly black. Pustules translucent, scattered or in patches. Spores oblong-ellipsoid,

slightly curved, scarcely constricted at the septum, 12–20 × 3–3·5μ, intermixed with chains of hyaline cells, 3–4·5 × 0·5μ.

On leaves of *Melampyrum pratense*. Dinnet, near Ballater (Trail). Sept.

Omphalodes

Marssonina Omphalodis Grove, in Journ. Bot. 1918, p. 342 (as *Marssonia*).

Spots scattered over the leaf, often confluent and occupying half of it or more, smoky-umber, without a distinct margin, the upper surface looking as if covered by a whitish wash. Pustules epiphyllous, up to 100μ diam., scattered, immersed, round, brownish. Spores oblong, rounded at both ends, mostly straight, often slightly constricted at the septum, the loculi very seldom unequal, 2–4-guttulate, 9–12 ×2·5–3μ.

On fading leaves of *Omphalodes verna*. Ayrshire (Boyd). July.

The whitish coating of the upper surface of the spots is due to the hairs and the loosened epidermis. Septum very delicate and difficult to see.

Populus

Marssonina Castagnei Magn. *l.c.* Died. p. 829, p. 770, f. 27. *Gloeosporium Castagnei* Desm. & Mont. in Ann. Sci. Nat. 1849, xii. 296. *Marssonia Castagnei* Sacc. Syll. iii. 768; Fung. Ital. pl. 1068. All. vii. 606, with fig. Mig. 573. Grove, in Journ. Bot. 1912, p. 53.

Spots round, confluent, brown, without any darker margin. Pustules small, epiphyllous, subcuticular. Spores oblong-pyriform or clavate, curved, distinctly septate below the middle, not constricted, 25–26 × 9μ (18–20 × 7–8μ, All.); sporophores short.

On living or fading leaves of *Populus serotina*, *P. pyramidalis*. Olton, Wk.; Surrey; Yorkshire; Cornwall. Sept.–Nov.

Spores oozing out and forming short whitish tendrils. It is stated to belong to *Pseudopeziza Populi-albae* Kleb. or to *Trochila Populorum* Edg. (*non* Desm.). It is recorded abroad on other species of *Populus*. The spots extend over the whole leaf, and are dotted over with the pustules. The septum of each spore is about one-third of its length from the base. But see *M. Populi, infra*.

Europe, N. Amer.

Marssonina Populi Magn. *l.c.* Died. 829. *Leptothyrium Populi* Lib. Fung. Ard. p. 257. *Marssonia Populi* Sacc. Syll. iii. 767; Fung. Ital. pl. 1062. All. vii. 605, with fig. Mig. p. 573, pl. 80, f. 9–11. *Asteroma labes* B. & Br. in Ann. Nat. Hist. 1841, vi. 364, pl. 11, f. 6; 1850, v. 455. *Gloeosporium labes* Cooke, Handb. 474.

Spots epiphyllous, suborbicular, occasionally confluent, brown, usually with a black border. Pustules convex, then flattened, becoming tawny. Spores obovoid or somewhat pyriform, septate below the middle, gently constricted, straight or curvulous, $15–20 \times 7–12\mu$, issuing in whitish tendrils; sporophores very short.

On living leaves of *Populus* (*alba*, *nigra*, *canescens*). Rushton, Norths.; Highgate; Durleston Bay, Dorset; Reigate; Swansea; Cheshire; Yorkshire; Lanarkshire; Stirlingshire; Ayrshire; etc. Jul.–Sept.

A common leaf-spot or Anthracnose of Poplars, destructive to young trees and appearing also on the twigs and branches as black spots. It does not differ much from *M. Castagnei* except that the latter is rarely black-bordered and has less constricted spores; but Klebahn maintains that there are two species on Poplar, one of which, *M. Populi-nigrae* Kleb. on *P. nigra*, *P. italica*, *P. canadensis*, belongs to *Trochila Populorum* Desm., while *M. Castagnei* Magn. on *P. alba* belongs to *Pseudopeziza Populi-albae* Kleb. (see Kleb. Nebenfr. 344).

"Forming irregular brown patches, scattered or occupying almost the whole of the upper surface of the leaf; the stroma when held up to the light is found to be disposed in a fibrillose form; spores forming short tendrils, subpyriform, with an obscure septum (not always visible) at the contracted part of the spore. The spores in the fresh plant show little granules, generally disposed in two patches" (Berk. of *Asteroma labes*).

Europe generally.

Potentilla and **Fragaria**

Marssonina Potentillae Magn. *l.c.* Died. p. 827, p. 770, f. 31. *Phyllosticta Potentillae* Desm. in Ann. Sci. Nat. 1847, viii. 31. *Marsonia Potentillae* Fisch. in Rab. Fung. Eur. no. 1857. Sacc. Syll. iii. 770; Fung. Ital. pl. 1070. All. vii. 607, with fig. Mig. 574. *Gloeosporium Potentillae* Oud. Nederl. Kruidk. Arch. ser. 2, i. 259.

Spots epiphyllous, roundish, blood-red. Pustules minute, subcuticular, covered, lens-shaped, at length black. Spores oblong-fusoid, falcate or rostrate at the apex, 1-septate, with four or more guttules, $18–25 \times 5–9\mu$; sporophores very short. (Fig. 106 *b*, p. 273.)

On living leaves of *Potentilla reptans*: Hereford; Wyre Forest; Curdworth, Rubery, Castle Bromwich, etc. near Birmingham. On *P. anserina*: Keswick; Lanarkshire; Ayrshire. On *P. Tormentilla* and *P. Comarum*, in Scotland, with narrower spores (3–4μ), in Scot. Nat. 1887, p. 89, but similar spores can be found mixed with the thicker ones on all the hosts. On *P. reptans*, Ireland.

Spots scattered all over the leaf, on the upper surface, varying in size but always small (about 1 mm.), dull blood-red in colour. Pustules minute, scattered over the spot, sometimes many. Spores ± oblong, constricted at the septum, tapering a little at each end, but more so at the apex which in profile is often beak-like and bent to one side, full of minute oil-drops and thick protoplasm, $20–25 \times 7–8\mu$. In June the pustules are usually filled with nothing but a granular mass. Frequently there are no spores to be found in them, even late in the year.

Var. **Fragariae.** *Marssonia Fragariae* Sacc. in Malpigh. 1896, x. 276. *Leptothyrium Fragariae* Lib. Exs. no. 162. Cooke, Handb. 423. *Gloeosporium Fragariae* Mont. in Kickx, Flor. Cr. Flandr. ii. 93. Sacc. Syll. iii. 705. All. vii. 476. Died. 774. Mig. 530.

Spots epiphyllous, indefinite, roundish, ochraceous, 2–3 mm. diam., with a broad blood-red margin. Pustules blackish, 70–100μ diam., crowded. Spores subcylindrical, 4–5-guttulate, curved and rostrate at the apex, 1-septate, constricted, $18–23 \times 5–6\mu$.

On leaves of *Fragaria vesca* (wild and cult.). Sutton Coldfield; Wisbech; Hampstead; Twycross; Suffolk; Gloucestershire; Wiltshire; Cheshire; Cumberland; Scotland (common). Jun.–Oct.

The pycnidial stage of *Diplocarpon Earliana* (Ell. & Ev.) Wolf; Klebahn assigns the var. to his *Fabraea Fragariae* (in Ber. Deutsch. Bot. Ges. 1924, xlii. 191, with figs.) which is without doubt the same fungus.

Europe, Siberia, N. Amer.

Salix

Marssonina Kriegeriana Magn. *l.c.* Died. 831. *Marssonia Kriegeriana* Bres. in Hedwig. 1892, p. 40. Sacc. Syll. xi. 575. All. vii. 609. Mig. 574.

Spots epiphyllous, roundish, minute, often confluent, black. Pustules whitish, convex, then flattened. Spores sub-

fusoid or rounded above, curved, hyaline, 1-septate below the middle, guttulate, 14–18 × 5–7 μ.

On leaves of *Salix cinerea*. Stair, Ayrshire (Boyd). Aug.

M. nigricans Ell. & Ev. in Proc. Acad. Phil. 1891, p. 84 (Sacc. Syll. x. 478) is very similar, but has larger spots, and the pustules are often hypophyllous. Cf. *M. salicicola, infra*, which seems to be the same thing as *M. Kriegeriana*.

Germ.

Marssonina salicicola Magn. *l.c.* Died. 831. *Marssonia salicicola* Bres. Fung. al. Saxon. lect. Krieg., in Hedwig. 1893, p. 32. Sacc. Syll. xi. 574. All. vii. 609. Mig. 574.

Spots epiphyllous, without definite border, reddish. Pustules punctiform, white. Spores clavate-pyriform, hyaline, 1-septate below the middle, 15–18 × 5–8 μ.

Reported on leaves of *Salix*. Somerset; near Guildford. May.

The pycnidial stage of *Pyrenopeziza Salicis-Capreae* Jaap.

Germ.

Sambucus

Marssonina Sambuci Magn. *l.c.* *Marssonia Sambuci* Rostr. in Bot. Tidsskr. 1899, p. 270. Sacc. Syll. xvi. 1011. All. vii. 609. Grove, in Journ. Bot. 1922, p. 167. *Ascochyta Rostrupii* Died. 395.

Spots roundish or angular, up to 1 cm. wide or more, visible on both sides, above fuscous, paler and almost ochraceous in the middle, at times concentrically zoned, below dusky and olive-brown. Pustules clustered in the middle of the spots, amphigenous, lens-shaped, prominent, brown or blackish, 80–100 μ diam. Spores oblong or cylindrical, rounded at the ends, at length 1-septate in the middle, scarcely constricted, colourless, 7–10 × 3 μ (8–13 × 3–4 μ, Died.). (Fig. 106 *d*, p. 273.)

On living leaves of *Sambucus nigra*. Richmond, Surrey. Aug.

Diedicke places this in Ascochyta, on the ground that there is a distinct but thin peridium; the spots in the Richmond specimen agreed very closely with his and Rostrup's descriptions, but no pycnidial wall could be detected.

Germ. Denm.

RHYNCHOSPORIUM Heinsen, Beobacht. über der neuen Getreidepilze, in Jahrb. Hamburg. Wissen. 1901, xviii, with 4 plates.

Forming pallid spots upon living leaves. Sterile hyphae creeping, fertile ascending with curved branches, forked and bearing spores on denticles. Spores shortly cylindrical, thickened upwards, with a short and oblique rostrum, hyaline, 1-septate in the middle.

A group of fungi which (according to one's taste or one's point of view) can be placed in either the Coelomycetes or the Hyphomycetes.

Alisma

Rhynchosporium Alismatis Davis, *l.c.* p. 420. *Septoria Alismatis* Oud. Mat. Myc. Néerl. p. 4. Sacc. Syll. iii. 571. All. vi. 726. Died. 485. *Ascochyta Alismatis* Ell. & Ev. in Journ. Mycol. 1889, p. 148. Sacc. Syll. x. 407. *Ramularia Alismatis* Fautr. in Rev. Mycol. xii. 125. Lindau, viii. 434. *Didymaria aquatica* Starb. in Bot. Centralbl. lxiv. 382. Sacc. Syll. xiv. 1058.

This is supposed to have occurred on *Alisma* and *Sagittaria*. But see Vol. I, p. 320–1, where it is recorded under Ascochyta. The differences of opinion on this species are truly remarkable.

Fr. Holl. Germ. Denm. Austr. Ital. U.S.A.

Gramineae

Rhynchosporium Secalis Davis, Notes on Parasitic Fungi VIII, in Trans. Wiscons. Acad. Sci. 1921, xx. 420. New Phytologist, 1928, p. 215, with figs. *Marssonina Secalis* Oud. in Konink. Akad. Wet. Amsterd. 1897, p. 88; in Hedwig. 1898, p. 181. Sacc. Syll. xiv. 1022; xvi. 1011. All. vii. 610. Grove, in Journ. Bot. 1922, p. 168. Lind, Dan. Fung. 484.

Spots indefinite, oblong or lanceolate, up to 1 cm. long, pallid, often bordered with purple, equally visible on both sides of the leaf. Pustules produced beneath the epidermis, almost imperceptible even with a lens, very pale but more translucent than the leaf tissue, roundish, flat, at first totally immersed, about 200μ diam. Spores oblong-fusoid, hyaline, 1-septate, curved in profile, often beaked at the apex and terminated by a rather obtuse mucro, $15–20 \times 3–4\mu$ ($11–16 \times 3{\cdot}5–5\mu$, Davis), the lower cell narrower than the upper; sporophores very short. (Fig. 107.)

On fading leaves of *Secale cereale*, *Hordeum*, *Bromus* and *Dactylis*. Cambridge; Devon; Cornwall; Dorset; Berkshire; Hampshire; etc. Rather common. May, Jun.

Some of the spores appear to have more than one septum. From Wisconsin it was reported on *Dactylis glomerata*, *Bromus arvensis*, and *Agropyron repens*, and Lind records it on *Avena* and *Milium*.

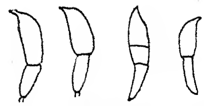

Fig. 107. *Rhynchosporium Secalis*: spores, × 600.

Lindau places this genus among the Hyphomycetes (ix. 756). Thus it joins the enigmatic troupe to which many of the species of Vermicularia, as also *Hainesia Rubi*, *Rhodesia subtecta*, *Marssonina perforans* (*qq.v.*) belong.

No one seems able to discover a criterion by which the boundary between the Coelomycetes and the Hyphomycetes may be satisfactorily demarcated. The proper, and only conclusive test, should be: "Where are the mature spores produced? Below the epidermis, or not until the proliferous hyphae have risen above it?" But there will always be room for difference of opinion.

Europe, U.S.A. Canada, New South Wales.

Rhynchosporium graminicola Heinsen, Beobacht. über der neuen Getreidepilze, in Jahrb. Hamburg. Wissen. Anst. 1901, xviii, with four plates. Sacc. Syll. xviii. 540. Lindau, Pilze, ix. 756, with fig.

Spots oblong, ochraceo-fuscous, unequal, 0·5–2 cm. long. Tufts of hyphae on the spots, depressed, Oidium-like, at first white, then becoming bluish-grey. Spores hyaline, 13–19 × 3·6μ, 1-septate near the middle, not constricted, the upper cell gradually thicker upwards, laterally beaked, conspicuously granular-cloudy within, the lower cell thinner and not granular; sporophores oblong, often forked above.

On living leaves of Grasses (*Triticum*, *Hordeum*, *Secale*) to which it can do much harm. Reported from Sussex, 1922. *n.v.*

This would appear to be merely a false interpretation of the previous species named by Oudemans in 1897. The spores are said to be exceedingly like those of *Marssonina Juglandis* and *M. Potentillae*.

Germ. Tyrol.

SEPTOMYXA Sacc. Syll. iii. 766.

Pustules immersed, at length erumpent or uncovered, often seated on a conical stroma, soft and bright-coloured. Spores ellipsoid or oblong, 1-septate, hyaline.

This genus is in suspense. There is a great difference in opinion about nearly all the species. Our four British recorded forms seem all to be merely stages in the development of Diaporthe or Cryptospora. It would be inadvisable to merge Septomyxa with Marssonina, similar though their spores are.

Acer

Septomyxa Tulasnei v. Höhn. in Ann. Mycol. 1903, i. 527. Mig. 575. ? *Myxosporium Tulasnei* Sacc. Syll. iii. 723 (1884). All. vii. 511. *M. Späthianum* All. vii. 511. Sacc. Syll. xiv. 1014. *Septomyxa Aesculi* Sacc. Syll. iii. 766, f. *Aceris* Roum. ? *Septomyxa Negundinis* All. in Ber. Bayer. Bot. Ges. 1897, v. 22; Krypt. Flor. vii. 611. Sacc. Syll. xiv. 1020. T.B.M.S. iv. 180. *Marssonina Tulasnei* Died. 822. *Stagonospora collapsa* Sacc. Syll. iii. 448.

Gloeosporium acerinum Westd. = *Marssonina acerina* Bres. = *M. decolorans* Kab. & Bub. in Oesterr. Bot. Zeit. 1904, p. 10 (and Died. p. 824, p. 823, f. 2), represents the leaf-form of the species.

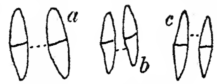

Fig. 108. *Septomyxa*: *a*, *S. Salicis*; *b*, *S. Aesculi*; *c*, *S. Tulasnei*; spores, all × 600.

Pustules immersed, erumpent, reddish-fuscous, surrounded by the torn periderm. Spores oblong-fusoid, obtuse at both ends, often biguttulate, at length 1-septate, mostly straight, rarely curvulous, rosy-pallid in mass, 12–20 × 2·5–4μ; sporophores subcylindrical, longer than the spore, often branched at the base. (Fig. 108 *c*.)

On the underside of living leaves and on recently dead branchlets of *Acer Pseudoplatanus*, *A. campestre*. Cheshire (Ellis). Ayrshire (Boyd). Sneyd's Coppice, Ws.; Matlock Bath; Glamorgan; Brecon. On *Acer Negundo*, Hadzor Hall, Ws. Mar.–Jul.

It is said to be the pycnidial stage of *Diaporthe* (*Chor.*) *longirostris* Sacc. = *Cryptospora Hystrix* Fckl. Von Höhnel wrongly calls it *Phomopsis Tulasnei* (in Sitz. Akad. Wiss. Wien, 1906, cxv. 681). The leaf-form, mentioned above, is found in the summer (July): see Ann. Mycol. 1913, xi. 540.

Cf. *Fusicoccum obtusulum* (Vol. I, p. 246) and *Cytodiplospora Aceris* (*ibid.* p. 344), which belong to *Diaporthe* (*Chor.*) *pustulata* Sacc.

There is great confusion about this overnamed Septomyxa; the spores seem to assume many shapes and sizes, and nobody knows which of its avatars really belong to *D. longirostris* (possibly all). Some of the spores are continuous, others are 1-septate, and one might

not be indisposed to think that many of the latter, e.g. in *S. Negundinis*, are merely the ascospores that have escaped from vanished asci.

Europe, Canada.

Aesculus

Septomyxa Aesculi Sacc. Syll. iii. 766. All. vii. 612. Mig. 575. Died. p. 832, p. 823, f. 3. Ellis, in T.B.M.S. v. 230. *Fusicoccum Aesculi* Corda in Sturm, D. Flor. III, pl. 52 (1829). *Phomopsis Aesculi* Lind, Dan. Fung. 422. *Diplodina truncata* Sacc. Syll. iii. 411. *Phoma diplodioides* Sacc. Syll. iii. 81. *Cryptosporium Hippocastani* Cooke, in Grevill. xiv. 4. *Phoma brunneo-tincta* Cooke, xvii. 42, *p.p.* ? *Fusicoccum petiolicolum* Bub. in Ann. Mycol. xiii. 28 (1915).

Pustules scattered or subgregarious, conico-truncate, covered by the epidermis, then erumpent at the vertex, whitish, then dingy-rose, 0·5–1 mm. diam. Spores elliptic-fusoid, obtuse or subacute at the ends, straight or curvulous, slightly tinged with colour in mass, at length faintly 1-septate, hardly constricted, $14–18 \times 3–3{\cdot}5\,\mu$ (sometimes wider); sporophores cylindric-conical, crowded, $14–15 \times 2\,\mu$, rising from a yellowish basal stratum. (Fig. 108 *b*.)

On twigs, branches, and fruits of *Aesculus Hippocastanum*. Kew Gardens, inside the husks (Cooke). On the inside and outside of the husks, Enville, Staffs. (Chesters). On branches, Cheshire (Ellis). Suffolk; Bushey Park; Oscott; Hadzor; Heythrop. Apr. May.

Lind (*l.c.*) classes this as Phomopsis. Cooke introduced confusion by erroneously imagining that his *Phoma brunneotincta* (*q.v.* Vol. I, p. 65) at Kew was the same as the homonymous species of Berkeley & Curtis. Fuckel recognised, in Symb. Myc. 193, that the Septomyxa was a conidial stage of his *Cryptospora Aesculi*. But, as I have shown in Kew Bull. 1919, p. 443, *Diaporthe aesculicola* Cooke, *D. Hippocastani* Cooke, and *Cryptospora Aesculi* Fckl. are all the same species, and are all three, in authentic specimens, closely accompanied by the Septomyxa, the Cryptospora being the young state before the ascospores develop a septum. This species is now called *Cryptodiaporthe Aesculi* by Petrak.

Fr. Belg. Holl. Germ. Denm.

Fagus

Septomyxa fagicola J. W. Ellis, in T.B.M.S. 1916, v. 231.

Pustules rather convex, black, at first concealed by the epidermis, then erumpent as a black globule. Spores oblong-fusoid, obtuse at both ends, straight or gently curved, 4-guttulate, 1-septate, $12–24 \times 2–3\,\mu$.

On twigs of *Fagus silvatica*. Derbyshire (Ellis). May.

The septum of the spores is indistinct until they are treated with iodine, when the vacuoles disappear and the septum becomes prominently visible.

Salix

Septomyxa Salicis Grove, in Journ. Bot. 1922, p. 147. Cf. *Myxosporium incarnatum* Fckl. Symb. Myc. 399, and *Septomyxa exulata* Sacc. Syll. iii. 767, which are possibly the same species, as is indeed *Septomyxa picea* Sacc. in Ann. Mycol. 1913, xi. 560, except for the colour of the disc.

Pustules thickly scattered, at first blackish, covered by the bark, then erumpent, up to 1 mm. diam., at length opening widely and disclosing a pink disc surrounded by the laciniae of the bark. Spores oblong-fusoid, tapering at both ends, singly almost colourless, in mass pinkish, for a long time eseptate, at length 1-septate, $12–15 \times 4–5\mu$ ($20–25 \times 8–10\mu$, Cooke?); sporophores linear or irregular, about as long as the spore and 2μ wide, rising from a dusky proliferous stratum. (Fig. 108*a*.)

On branches of *Salix cinerea*, Kew Gardens (Cooke). On *Salix*, Freshfield, Lancs. (Travis). On *S. fragilis*, near Tanworth-in-Arden. On *S. vitellina*, Halesowen. May–Oct.

Very different, when old, from its appearance at first; when young the spores ooze out in irregular masses; at the last, it presents a broad, flat, sinuous or angular disc, which when freshly exposed is of a bright pink colour.

Like our other Septomyxas this appears to be part of the life-cycle of a Diaporthe. Cf. *Phomopsis pallida* Sacc. Syll. xviii. 264, which has been found on *Salix*; also *Rhabdospora salicella*, in Vol. I, p. 444.

The student should notice the parallelism between species of Septomyxa and species of Cytodiplospora. I am certain that in this group, as in several others, the same fungus can have on one occasion a distinct (and even thick) peridium, on another none at all! In fact, this Septomyxa might be merely an avatar of *Discella carbonacea*, though the pink colour of *S. Salicis* is very striking.

PSEUDODISCOSIA Höst. & Laub. in Gartenwelt, 1921, p. 65.

Pustules on purple-bordered spots, erumpent, small. Spores somewhat obclavate, curved, aristate, at length 1–3-septate.

There is no trace of a peridium, and the genus was thought

from the first to be closely allied to Fusarium. It was said to resemble Discosia somewhat in its spores, but that was a misconception. Both our species are only forerunners of Heteropatella and there is a curious likeness between the spores of the two genera which is very suggestive.

It is, in fact, a case of what an up-to-date mycologist might call a "Fusidomus-complex". The Pseudodiscosia spores at first arise without any peridial covering, then an excipulum is developed and the same spores (only very slightly modified) go on being produced within this excipulum (Heteropatella); finally the excipulum again is very slightly modified and becomes a perithecium producing ascospores, i.e. a Heterosphaeria. Thus we are justified in drawing a parallel:

as Fusarium : Fusidomus : Gibberella

so is Pseudodiscosia : Heteropatella : Heterosphaeria.

Moreover, since the change in the nature of the spores produced may arise at varying times during the development, it follows that we may *sometimes* find the two kinds of spores produced *within the same conceptacle*, as is so frequently seen in Heterosphaeria and other similar Ascomycetes.

If these arguments are true, Pseudodiscosia belongs to the Hyphomycetes, as is in fact obvious from a consideration of Miss Wakefield's excellent drawings in T.B.M.S. xi. 171, f. 2 *a*, *b*. No true Coelomycete ever has sporophores like those shown in these figures. That statement, however, does not by any means imply that Pseudodiscosia must be merged in Cercosporella.—*Pestalozzina hendersonioides* Died. p. 837, p. 823, f. 10, on *Bupleurum*, is obviously a Pseudodiscosia.

Antirrhinum

Pseudodiscosia Antirrhini Budd. & Wakef. in T.B.M.S. 1929, xiv. 220, note. *Cercosporella Antirrhini* Wakef. in Kew Bull. 1918, p. 233.

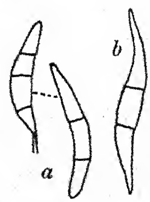

Fig. 109. *Pseudodiscosia*: *a*, *P. Antirrhini*; *b*, *P. Dianthi*; spores, ×600.

Spots scattered, roundish, up to 5 mm. diam., sometimes bounded by a narrow purple margin, at length becoming pale and dropping out. Pustules amphigenous, pale-pinkish, waxy, many on each spot. Spores narrowly obclavate, curved, 25–30μ long, at length 1–3-septate, not constricted, then furnished above with a long awl-like point and sometimes with a shorter one at the base; sporophores numerous, erect, branched. (Fig. 109 *a*.)

On living leaves of *Antirrhinum* (cult.). South of England, 1917, 1918, 1920, etc.

First described as a species of Cercosporella. It is near the borderline between the Coelomycetes and the Hyphomycetes. It was followed on the over-wintering stems by *Heteropatella Antirrhini* B. & W. (*q.v. supra*), which was only the abnormal state referred to above.

Dianthus

Pseudodiscosia Dianthi Höst. & Laub. in Gartenwelt, 1921, xxv. 65. Gard. Chron. 1927, lxxxi. 196, 216, f. 98, 99, 108, 109. Buddin & Wakefield, in T.B.M.S. 1929, xiv. 215, with figs.

Spots large, 1·5–3·5 cm. wide, amphigenous, brown, then whitish-grey, with a purple margin. Pustules up to 300μ diam., subcuticular, discoid, bursting the cuticle and then surrounded by its laciniae. Spores variable, oblong- or obclavate-fusoid, slightly curved or falcate, colourless or faintly tinged with pink, granular, then 2- or 3-septate, occasionally constricted at the septa, $12–24 \times 3–7\mu$, often with a subulate appendage at each end, the upper 8μ, the lower 3μ long. (Fig. 109 *b*.)

On leaves, stems, pedicels, bracts, and sepals of cultivated Carnations (*D. Caryophyllus*). Somerset; Sussex; Berkshire; etc. Spring.

The cause of a virulent disease in Holland and Germany, which is called "Leaf-rot" of Carnations. See *Heteropatella valtellinensis* Wollenw. *supra*, p. 156, to which this Pseudodiscosia belongs.
Holl. Germ.

PESTALOZZINA Sacc. Syll. iii. 800 (as subgenus).

Pustules ± like those of Pestalotia, but spores hyaline, transversely septate, without any tinge of colour.

The species that have been placed in this genus are of very diverse character; it is a purely artificial genus.

Pestalozzina uniseptata, sp. nov.

Pustules immersed, depressed-globose, $200–300\mu$ diam., scattered or in little groups, black, showing through the epidermis and at length splitting it. Spores numerous, fusoid,

hyaline, cloudy within with guttules, but quite colourless, tapering at each end into a delicate colourless curved appendage (but not cut off from it by a septum), 57–72 × 5–7 μ; sporophores very short. (Fig. 110.)

On an old fragment of a monocotyledonous leaf (? *Typha*) washed up by the sea on the beach at Gorleston, Suffolk (E. A. Ellis). Mar.

There is no trace of a peridium; the blackish colour is due to the discoloured cells of the matrix. The spores stand in the pustule in the manner represented in Diedicke's drawing (p. 823, f. 10) of *Pestalozzina hendersonioides*, or as they do in Scolecosporium. A spore can easily break into two at the septum. It is possible that this species, like that of Diedicke, really belongs to Pseudodiscosia, but it is placed in Pestalozzina until more is known about it.

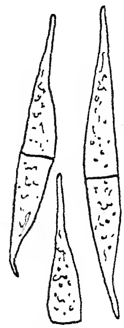

Fig. 110. *Pestalozzina uniseptata*: spores, × 600.

SEPTOGLOEUM Sacc. in Mich. ii. 11.

Pustules small, subepidermal, slightly erumpent, brownish or pale in colour. Spores linear or oblong, ultimately forming two or more transverse septa, hyaline, without appendages, growing erect on short sporophores.

It grows on living or fading leaves and branches, and presents a rather close similarity to Phleospora.

Aesculus

Septogloeum Aesculi, comb. nov. *Phleospora Aesculi* Cooke, in Grevill. xvi. 48. Sacc. Syll. x. 398. *P. Capronii* All. vi. 934.

Pustules subgregarious, on darkish spots, hypophyllous, immersed, at length opening above. Spores cylindric-ellipsoid or obtusely fusoid, occasionally bent, colourless but cloudy, 3- (rarely 4-) septate, 22–28 × 5–7 μ (30–35 × 8 μ, Cooke, *l.c.*), oozing out in masses and easily separating each into two or more parts at the septa.

On dry leaves of *Aesculus Hippocastanum*. Shere (Capron). Oct.

Specimen in Herb. Kew examined. The leaves are not, as stated by mistake in Grevillea, those of *Castanea vesca*. This is probably a further development of one or other of the simpler species recorded on *Aesculus*.

Denm.

Equisetum

Septogloeum Equiseti Died. p. 835, p. 823, f. 9. Mig. 579. *Septoria Equiseti* Desm. *apud* Moug. Stirp. Crypt. Vog. no. 1264. Sacc. Syll. iii. 576. Trail, in Scot. Nat. 1888, ix. 231. *Libertella Equiseti* Desm. in Ann. Sci. Nat. 1847, viii. 179. *Gloeosporium Equiseti* Ell. & Ev. in Journ. Mycol. 1888, p. 52. Lind, Dan. Fungi, pl. 8, f. 95, 96. Sacc. Syll. x. 463. All. vii. 472. *Phleospora Equiseti* v. Höhn. in Ber. Deutsch. Bot. Ges. xxxv. 356. *Titaeospora detospora* Bub. in Ann. Mycol. xiv. 345. *Septoria detospora* Sacc. Syll. iii. 576. *Rhabdospora Equiseti* and *R. detospora* All. vi. 901.

Pustules small, scattered, immersed, with no true pycnidial wall, but staining the epidermis deeply above them with ferruginous-brown, occasionally arranged in series or even confluent, 0·5–1 mm. broad; afterwards the epidermis becomes whitish in the centre and is burst by an irregular torn pore. Spores crowded, parallel, linear or filiform, obtuse at one or both ends, often curvulous, hyaline, provided with a row of oil-drops or ultimately faintly 1–3-septate, 25–50 × 2·5–3·5 μ, oozing out in a little whitish or pallid globule; sporophores short, erect, narrow, rising in a dense array from a thick small-celled nearly colourless basal stratum. (Fig. 111 *a*.)

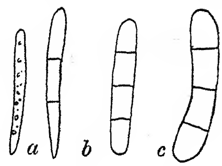

Fig. 111. *Septogloeum*: *a*, *S. Equiseti*; *b*, *S. Fragariae*; *c*, *S. Ulmi*; spores, all × 600.

On withering stems of *Equisetum arvense*, near Montrose and Aberdeen (Trail). On dead stems of *Equisetum limosum* lying in Llyn-cwm-Mynach, near Dolgelly, Mer. Mar. Apr.

Said to be the pycnidial stage of *Stamnaria Persoonii* Fckl.

In the Scottish specimens the attacked branches were contorted. Several spores may remain firmly attached to part of the basal stratum, and thus appear to be attached to one another.

Fr. Germ. Austr. Canada (on *E. silvaticum*).

Fragaria

Septogloeum Fragariae v. Höhn. in Ann. Mycol. i. 524. Died. p. 835, p. 823, f. 7. *Stagonospora Fragariae* Bri. & Har. in Rev. Mycol. 1891, p. 17. *Septoria Fragariae* Desm. *p.p.* *Septogloeum Comari* Bres. & All. *S. Potentillae* All. in Ber. Bayer. Bot. Ges. iv. 88.

Spots epiphyllous, irregularly angular or roundish, brown or yellowish-ochre, at times areolate or surrounded by a darker border. Pustules epiphyllous, at first covered, then widely open, pale-brown, 75–100 μ diam. Spores cylindrical,

obtuse at both ends, straight or faintly bent, 3-septate, hardly constricted, hyaline, cloudy or guttulate, 30–45 × 4–8μ; sporophores almost imperceptible, with a thick proliferous stratum below. (Fig. 111 *b*.)

On living leaves and on the fruit of cultivated *Fragaria vesca*. Long Ashton, Somerset. Feb.

This species is considered to occur also on *Potentilla* and *Comarum*. It is probable that it is merely a state of *Septoria Fragariae* Desm. (*q.v.* in Vol. I, p. 383). The question is whether there is always a pycnidial wall or not; the amount of the wall may vary according to the vigour of its growth. See Ogilvie, in Ann. Rep. Long Ashton Res. Station, 1931, p. 118 and 1932, p. 102. At any rate the two forms belong to the same life-cycle.

Germ. Austr. Canada.

Morus

Septogloeum Mori Briosi & Cav. Fungh. Paras. no. 21. *Septoria Mori* Lév. in Ann. Sci. Nat. 1846, v. 279. *Phleospora Mori* Sacc. Syll. iii. 577. *Fusarium maculans* Béreng. in Atti Congr. Mil. 1844, p. 474. *Phleospora maculans* All. vi. 935.

Spots roundish, 1–2 mm. diam., whitish or dark-ochraceous, with a broad red-brown border. Pustules generally epiphyllous, gregarious, immersed, globose, 50–80μ diam., often imperfectly formed. Spores cylindrical, curvulous, attenuated upwards, rather obtuse at the ends, 3-septate, guttulate, 40–50 × 4μ; sporophores variable, short.

On leaves of *Morus*. Clevedon; Chepstow; etc. Sept.

A harmful parasite, causing the leaves to fall early. The spores have occasionally four or five septa, in which case it becomes *Phl. moricola* Sacc. *l.c.* 578. It has been assigned as a pycnidial stage to a Mycosphaerella.

Europe, N. America, Australia, India.

Salix

Septogloeum salicinum Sacc. Syll. iii. 802. Smith, in T.B.M.S. iii. 119, pl. 6, f. 6. All. vii. 626. *Gloeosporium salicinum* Peck, 33 Rep. N.Y. State Mus. p. 26.

Pustules irregularly scattered over the upper surface of the leaf, whitish, seated on a brown spot of irregular form. Spores elongate, subfusoid, bent or curved, 40–55μ long, with three indistinct septa, each loculus guttulate.

On living and decaying leaves of *Salix viminalis*. Argyllshire (Boyd). Sept.

In the British specimens the length of the spore scarcely reaches 35 μ, the breadth is 7–10 μ. One septum is always clearly visible, the others indistinct or often absent.

Germ. Denm. U.S.A.

Ulmus

Septogloeum Ulmi Died. p. 836, p. 823, f. 8. Mig. 580. *Septoria Ulmi* Fr. Nov. Flor. Suec. v. 78 (1819). Cooke, Handb. p. 441, f. 166. Grev. Scot. Cr. Flor. pl. 112. *Phleospora Ulmi* Wallr. Comp. Fl. Cr. Germ. no. 1545 (1833). Sacc. Syll. iii. 578. *Phl. ulmicola* All. vi. 936.

Spots irregular, brown, occasionally marginal, often very small, without a distinct border (on the leaves). Pustules scattered or clustered, hypophyllous, thin, brown. Spores cylindric or subfusoid, sometimes clavate or sausage-shaped, rounded at both ends or tapering below, at first quite straight, then faintly curved, continuous, guttulate or granular, after a time 1-septate, $20–28 \times 2–3{\cdot}5\,\mu$, at length 3- (or rarely 4-) septate, $30–58 \times 5–6\,\mu$ ($40–56 \times 6–8\,\mu$, Ellis), not constricted, issuing in little whitish masses. (Fig. 111*c*.)

On living leaves, and occasionally on branches, of *Ulmus campestris*, *U. montana*. All over the British Isles, wherever the Elm grows. Sept. Oct.

It has usually a very imperfectly developed peridium or even none at all. The spores frequently ooze out in the form of little whitish heaps on the underside of the leaves and afterwards become effused; in Worcestershire, I have found the pustules on small branches of *U. montana*, in February, mixed both with the pustules of *Cryptosporella hypodermia* Sacc. and with the (presumably) Phomopsis-stage of the latter which had abundant A- and B-spores.

Fuckel guessed that it was a pycnidial stage of his *Phyllachora Ulmi* (*Dothidella Ulmi* Wint.), but Klebahn proved that it is (on the leaves) a stage of his *Mycosphaerella Ulmi* (Jahrb. f. wiss. Bot. 1905, xli. 492 ff.). I think the fungus on the branches is, what it appeared to be in the Worcestershire specimen, identical with that on the leaves.

Europe, N. America.

PSAMMINA Rouss. & Sacc. Contr. Myc. Belg. iv. 295.

Pustules immersed, subepidermal, flat, minute. Spores cylindrical, transversely septate, nearly hyaline, clinging many together at their bases, persistently, in a diverging radial arrangement, so as to form a little head at the apex of a filiform sporophore.

It presents some resemblance to a dwarf form of Prosthemiella.

Psamma

Psammina Bommeriae Rouss. & Sacc. Contr. Myc. Belg. iv. 295. Sacc. Syll. x. 498. All. vii. 628. Died. p. 883, p. 823, f. 11. Grove, in Journ. Bot. 1922, p. 168, pl. 563, f. 17.

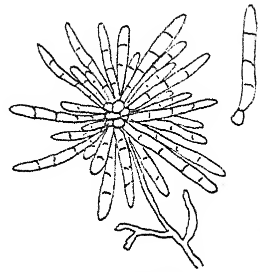

Fig. 112. *Psammina Bommeriae*: group of spores and single spore, × 600.

Pustules immersed, scattered, somewhat olivaceous, roundish, flat, 0·5–1 mm. diam. Spores cylindrical, 2–5-septate, not constricted, singly hyaline, 20–30μ long, joined together at the base in groups of 15–25, at first erect, fasciculate, then diverging and forming a roundish head; masses of spore-heads at length extruded and clinging together to form little fugacious pallid granules on the leaf. (Fig. 112.)

On dead leaves of *Psamma arenaria*. Cumbrae, Bute (with *Anthostomella ammophila* Sacc.); Dundonald and Stevenston, Ayrshire (Boyd). Freshfield, Lancs. (Travis). Borth; Pwllheli; Anglesey; etc. Summer and winter.

Recorded by Diedicke on *Triticum junceum* also.
Belg. Holl. Germ.

CYLINDROSPORIUM Sacc. in Mich. ii. 12 (*non* Greville).

Pustules under the epidermis, without the faintest trace of a peridium, colourless or nearly so, discoid or effused. Spores filiform, eseptate or rarely with a few septa, hyaline, often flexuose or curved.

Many of the British species formerly assigned to this genus are merely conidial forms of Entyloma and belong to the Tilletiaceae, e.g. *C. Alismacearum* Sacc., *C. Ficariae* Berk., *C. Ranunculi* Sacc. Others are species of Ramularia (Hyphomycetes) misunderstood, e.g. *C. niveum* B. & Br., *C. calceum* Desm., *C. rhabdosporum* B. & Br., *C. Senecionis* B. & Br., and *C. Valerianae* Speg. Still others resemble Phleospora so closely that the assignment to one genus or the other is simply a matter of taste or personal experience, e.g. *C. Pseudoplatani* Died. These latter have already been treated of, so far as they

are British, in Vol. I, pp. 431–6, but the true Cylindrosporia await us now. For the greater convenience of beginners, however, some of the excluded species are entered here.

Chrysanthemum

Cylindrosporium Chrysanthemi Ellis & Dearn. New Spec. Canad. Fung. in Canad. Rec. Sci. 1893, p. 271. Sacc. Syll. xi. 583. Massee, Dis. Cult. Pl. 447. Duggar, Fung. Dis. Pl. 343.

Spots indefinite, 1 cm. or more broad, brownish, becoming blackish. Pustules immersed, amphigenous, 100–170μ broad. Spores fusoid, nearly straight, $50–100 \times 3–4{\cdot}5\mu$, at length expelled. (Fig. 113 *a*.)

On leaves of cultivated *Chrysanthemum*. Occasionally reported in Britain. It produces striking deformations of the leaves, which hang limply and do not fall.

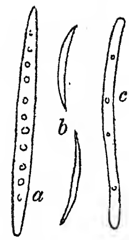

Fig. 113. *Cylindrosporium*: *a*, *C. Chrysanthemi*; *b*, *C. Pruni*; *c*, *C. Padi*; spores, all $\times 600$.

The spores of the Cylindrosporium are very similar to those of *Septoria Leucanthemi* (Vol. I, p. 375), but there is no sign of a peridium.

N. Amer.

Oxalis

Cylindrosporium Oxalidis Trail, in Scot. Nat. 1887, ix. 89. Grevill. xv. 110. Sacc. Syll. x. 502. All. vii. 728.

Pustules scattered on round dry brown spots which are pale-margined and 1–3 mm. diam., subepidermal, opening by a wide pore. Spores filiform, curved, slightly tapering to the ends, $20–25 \times 1\mu$.

On leaves of *Oxalis Acetosella*. Near Aberdeen (Trail). *n.ex.* Sept.

A doubtful species.

Prunus

Cylindrosporium Padi Karst. Symb. Myc. Fenn. xv. 159. Sacc. Syll. iii. 738. All. vii. 729. Died. p. 845, p. 823, f. 15. Mig. 607. Massee, Dis. Cult. Pl. p. 446, f. 132. Duggar, Fung. Dis. Pl. p. 339, f. 162–4. Gard. Chron. 1919, lxvi. 154. *Ascochyta Padi* Lib. *p.p.* *Septoria Padi* Lasch, in Klotzsch, Herb. Myc. no. 457. *Cylindrosporium Tubeufianum* All. vii. 729, with fig. (on the fruits). Cf. *Hainesia Feurichii* Bub. in Ann. Mycol. 1906, iv. 119. Sacc. Syll. xxii. 1176.

Spots amphigenous, angular, fuscous. Pustules hypophyllous, covered by the slightly swollen epidermis. Spores

filiform, curved or flexuous, delicately guttulate, $48–62 \times 2\mu$, oozing out as a pinkish globule which afterwards becomes effused. (Fig. 113 *c*.)

On living or fading leaves and (?) fruits of *Prunus Padus*. Scotland (Boyd). No English specimens seen.

This is a true Cylindrosporium; the spores arise in dense layers on very short hyphae within a simple cavity of the leaf. It is thought to be the pycnidial stage of *Pseudopeziza Jaapii* Rehm. Bubák's Hainesia, which accompanied it, had oblong spores $3–4 \times 1–1{\cdot}5\mu$. ? A microconidial stage of it.

There are other species of Cylindrosporium on *Prunus* which have different spores. According to Higgins (Science, 1913, xxxvii. 637 and Amer. Journ. Bot. 1914, i. 165) there are three: (1) *C. hiemale*, on *P. avium*, *P. Cerasus*, *P. pennsylvanica*, with an ascophorous stage *Coccomyces hiemalis*; (2) *C. prunophorae*, on *P. domestica* and its allies, with *Cocc. prunophorae*; and (3) *C. lutescens*, on *P. serotina*, *P. virginiana*, and *P. mahaleb*, with *Cocc. lutescens*. The lengths of the pycnidial spores of these three are given respectively as (1) 45–65 $\times 2{\cdot}5–4\mu$, (2) $46–65 \times 3{\cdot}5–5\mu$, (3) $50–87 \times 3{\cdot}5–5\mu$. In each case also there were found some pycnospores in the same conceptacles as the asci, and microconidia (Cytospora-like), about $4–5\mu$ long, occurred in the pustules with the pycnospores.

Besides these species, on *Prunus* there have been found *Cyl. Pruni* Died. (*q.v. infra*) with shorter spores, and *Cyl. Pruni-cerasi* Massal. (see Died. p. 845), with spores $18–25 \times 1\mu$. These shorter pycnidial spores, however, remind one rather of a Rhabdospora devoid of pycnidium. It is evident that Higgins' results require amplification by other workers.

Europe (as far south as Switz.), N. America.

Cylindrosporium Pruni Died. in Ann. Mycol. x. 486; Pilz. Brand. p. 845, p. 823, f. 13. Mig. 607. *Rhabdospora Pruni* Syd. in Hedwig. 1899, p. (139). Sacc. Syll. xvi. 977. All. vi. 918.

Spots epiphyllous, numerous, roundish, 3–6 mm. diam., pallid-brown, dry and dead-looking, scarcely bordered, at length dropping out and leaving "shot-holes". Pustules densely scattered over the spots (but afterwards spreading on to other parts of the leaf), minute, blackish, $100–150\mu$ diam. at length opening by a pore. Spores filiform, very slender, hyaline, continuous, eguttulate, curved like a bow, slightly thicker in the middle, $15–20 \times 1{\cdot}5\mu$. (Fig. 113 *b*.)

On leaves of *Prunus Padus*. Skelmorlie, Ayrshire (Boyd). Oct.

These spores exactly resembled Diedicke's drawing (f. 13), but Sydow's specimens from which that drawing was made were on dry branches of *Prunus japonica* at Berlin.

Germ.

Saxifraga

Cylindrosporium microspermum Sacc. in Mich. ii. 169; Syll. iii. 738. All. vii. 731. Grove, in Journ. Bot. 1918, p. 341, pl. 550, f. 15. Mig. 608. *Fusidium microspermum* Speg. Dec. Myc. p. 120.

Spots circular, indeterminate, amphigenous, pallid-yellow on both sides. Pustules hypophyllous, covered by the swollen epidermis. Spores cylindrical, tapering slightly towards each end, acute at the extreme tip, hyaline, sometimes slightly curved, $10–15 \times 1\mu$, at length expelled and forming a snow-white pruinose coating over the part affected.

On living leaves of *Saxifraga oppositifolia*, which it kills. Cruach Ardrain, Crianlarich, Perthshire (J. R. Lee). Ben Lawers (Boyd). July.

The infected plants are easily discerned, because of the abnormal pale-green colour of the leaves at the tips of the branches.

Germ. Ital.

EXCLUDED

(TILLETIACEAE)

Alisma

Cylindrosporium Alismacearum Sacc. Syll. iii. 740. All. vii. 723.

"Pustules punctiform, subepidermal, then more or less erumpent. Spores rod-shaped, slightly curved, pluriguttulate, rather obtuse at the ends, about $30 \times 1{\cdot}5–2\mu$."

On leaves of *Alisma Plantago*. King's Lynn (Plowright).

There are two fungi found in herbaria under this name: (1) The specimens with numerous small round whitish brown-bordered spots are *Ramularia Alismatis* Fautr. (2) But, when it is found, as Saccardo says, "in company with *Entyloma Alismacearum*", it is nothing but the primary conidia produced on the promycelium of *Doassansia Alismatis* Cornu (=*Entyloma Alismacearum*). These accumulate on the outside of the leaf, above the sori of the *Doassansia*, and simulate the spores of a *Cylindrosporium*.

Europe, Asia, N. Amer.

Ranunculus

Cylindrosporium Ficariae Berk. in Ann. Nat. Hist. 1838, i. 263; 1875, xv. 34; and in Grevill. iii. 184. Sacc. Syll. iii. 737; Fung. Ital. pl. 1087. All. vii. 725, with fig. Died. 843. Mig. 604. *Gloeosporium*

Ficariae "Berk." in Cooke, Handb. 475. Sacc. Syll. iii. 700. All. vii. 496. *Fusidium Ranunculi* (*Ficariae*) Bon. Handb. Mykol. p. 43, pl. 1, f. 7.

"Pustules various, covered by the epidermis, flat. Spores rod-shaped, flexuous, somewhat acute at the ends, pluri-guttulate, $20–35 \times 2–2{\cdot}5\,\mu$."

On living leaves of *Ranunculus Ficaria*, *R. sceleratus*, less often of *R. repens*. Common. Early spring (Apr.).

On *R. Ficaria* this fungus is said to form small white angular spots, showing mostly on the under surface, bounded by the veins, about 1–2 mm. diam., powdered when fresh by the spores as if strewn with flour. But these spores are not what has been alleged, being really the conidia of *Entyloma Ranunculi* Schröt. (=*E. Ficariae* Fisch. v. Waldh.).

By making a transverse section of the leaf, the resting spores (chlamydospores) can be found abundantly in crowded clusters in the subjacent tissues. They are subglobose or slightly angular, colourless, then pale-brownish according to age, with a smooth wall $1–1{\cdot}5\,\mu$ thick, and measuring on the average about $14 \times 10\,\mu$ or $13\,\mu$ diam.

There are several forms of spores to be met with concurrently on the surface of *R. Ficaria* in this case: (1) Long bodies, tapering to very acuminate points, and furnished with a row of guttules; others (2) shorter, irregularly subfusoid, acute at both ends but more so below, very granular within, and measuring about $20 \times 2–3\,\mu$; and finally sometimes (3) a vast number of minute oblong-ovoid Gloeosporium-like spores, about $5–6 \times 3\,\mu$, containing 1–3 irregularly placed oil-globules. It is these latter which no doubt suggested the name, *Gloeosporium Ficariae*, which was employed by Cooke in 1871.

Spores (1) and (2) are Brefeld's primary and secondary conidia; Bonorden figured these two kinds (*l.c.*). The relation of (3) to these, if any, I could not determine. The spots appear at first snow-white; when the conidia have vanished, they still appear whitish from the destruction of the chlorophyll, but ultimately they become brownish.

There is another species of *Entyloma*, *E. microsporum* (Unger), found on the leaf-stalks and leaves of the same and other species of *Ranunculus*, which Berkeley confused with this species. *E. microsporum* is much less common, and does not produce conidia in any abundance—at any rate, not on to the surface of the host-plant.

Fr. Holl. Germ. Austr. Ital.

Cylindrosporium Ranunculi Sacc. in Mich. i. 540; Syll. iii. 737; Fung. Ital. pl. 1088. All. vii. 731, with fig. on p. 722. Died. 846. Mig. p. 608, pl. 89, f. 5–8. *Fusidium Ranunculi* Bon. *p.p.*

"Pustules subepidermal, like those of *C. Ficariae*. Spores of two kinds: (1) filiform-fusoid, flexuose, granular, about

$80 \times 2\mu$; (2) shorter, thicker, cloudy, occasionally bent, 18–$20 \times 2{\cdot}5$–3μ; sporophores filiform, hyaline, rather obtuse at the apex" (Allescher).

On leaves of *Ranunculus acris* and *R. bulbosus*. Lyndhurst (Cooke). *n.v.*

No doubt Cooke's spores were also those of a species of Entyloma. The two kinds drawn by Allescher are, respectively, the Brefeldian primary and secondary conidia. See Buller's Researches on Fungi, Vol. V, p. 219, f. 107 F. Allescher's "sporophores" are germ-tubes!
Fr. Germ. Ital.

(Hyphomycetes)

Caltha

Cylindrosporium niveum B. & Br. in Ann. Nat. Hist. 1875, xv. 34; Grevill. iii. 184. Sacc. Syll. iii. 737. All. vii. 724. Died. 841. Mig. 604. *C. Ranunculi β Calthae* Sacc. Syll. 738.

"Spots numerous, crowded, snow-white, 2–4 mm. broad, often confluent, surrounded by a fuscous border. Spores oblong, 1-septate, 50μ long, on short sporophores."

On leaves of *Caltha palustris*. Shrewsbury (Leighton). Lyndhurst (Cooke). New Pitsligo (Fergusson). Braemar (Trail). Mar.–Aug.

All these specimens, and all others which I have seen under this name, were *Ramularia Calthae* Lindroth (see Sacc. Syll. xviii. 546).
Germ. Roumania.

Plantago

Cylindrosporium rhabdosporum B. & Br. in Ann. Nat. Hist. 1875, xv. 34; Grevill. iii. 183. Sacc. Syll. iii. 739. All. vii. 728. *Septoria rhabdospora* B. & Br., Herb. Berk. no. 100!

"Spots amphigenous, more or less orbicular, brown, visible on both sides of the leaf. Spores chiefly hypophyllous, forming little white radiating fascicles, oblong, obtuse at the ends, 1–3-septate, 20–$50 \times 3{\cdot}5$–5μ; sometimes a second spore is developed at the top of the first."

On living leaves of *Plantago lanceolata*. Glamis; Aberdeen.

It is quite certain that this is merely *Ramularia plantaginea* Sacc. & Berl. (Syll. iv. 214). The appearance "slightly hollowed out at the sides" arises when the spores have somewhat shrunken.

Senecio

Cylindrosporium Senecionis B. & Br. in Ann. Nat. Hist. 1876, xvii. 142. On *Senecio vulgaris*, Rannoch (Buchanan White).

This is undoubtedly *Ramularia Senecionis* Sacc. Syll. iv. 210.

Valeriana

Cylindrosporium Valerianae Speg. in Mich. i. 475. This species, which is recorded "on *Valeriana officinalis* Aberdeen", is without doubt *Ramularia Valerianae* Sacc. Syll. iv. 207; Fung. Ital. pl. 1007.

CRYPTOSPORIUM Kunze, Myk. Hefte, i. 1 (emend. Corda).

Pustules on twigs or branches, conico-discoid, covered by the periderm, then erumpent at the middle, sometimes seeming to have the semblance of a pycnidium, saprophytic. Spores fusoid, falcate, rather large, eseptate (or faintly septate), hyaline, pedicellate.

Some of these species are pycnidial stages of Cryptospora or Cryptosporella.

Aesculus

Cryptosporium Hippocastani Cooke, in Grevill. xiv. 4. Sacc. Syll. x. 506. All. vii. 742.

"Pustules cortical, covered, splitting the bark and confluent longitudinally, pallid. Spores oblong-fusoid, rather obtuse, eguttulate, $18–20 \times 5\mu$; sporophores simple or forked, twice as long as the spores."

On branches of *Aesculus Hippocastanum*. Kew Gardens.

"Spores oozing out and forming a white farinaceous margin to the fissures." Cooke says (*l.c.*) that it is closely allied to *C. coronatum* Fckl. On examination I find the spores of the original specimen to be *all* delicately uniseptate in the middle, $13–16 \times 3–4\mu$, oblong-fusoid, somewhat pointed at the ends; therefore it = *Septomyxa Aesculi* Sacc. (*q.v. supra*, p. 284).

Alnus

Cryptosporium Neesii Corda, in Sturm, Deutsch. Kr. Fl. iii. 109, pl. 51. Tul. Carp. ii. 145, pl. 17, f. 29. Cooke, Handb. pp. 424, 829. Sacc. Syll. iii. 740; Fung. Ital. pl. 1095. All. vii. 742, with fig. Died. p. 850, p. 823, f. 19. Mig. p. 610, pl. 95, f. 5–8. Cf. *Libertella alba* Lambotte, *infra*, p. 305.

Pustules subcutaneous, for a long time covered, at length erumpent at the vertex, conico-discoid, olivaceous-black

within. Spores fusoid or cylindric-fusoid, usually much curved, lunate or arcuate, rarely with a few guttules, very granular, but singly colourless, 35–55 × 4–6μ, at length issuing in pale-flesh-coloured tendrils; sporophores short, straight, 5–7 × 1·5μ, rising from a dusky-green stratum. (Fig. 114, right.)

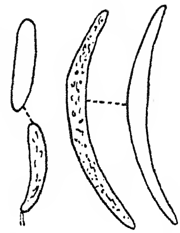

Fig. 114. *Cryptosporium*: *C. Tami* (left); *C. Neesii* (right); spores, × 600.

On dead twigs and branches of *Alnus glutinosa*. Birmingham; Staffordshire; Derbyshire; Cheshire; Porlock; N. Yorkshire; Ayrshire; etc. Sept.–May.

The pycnidial stage of *Cryptospora suffusa* Tul. The Birmingham specimens were accompanied by and intermingled with a large quantity of *Ditopella fusispora* de Not., which is considered to be a form (*minor*) of *Cryptospora suffusa*; the spores of the Ditopella were delicately 1-septate, 16–20 in each ascus.

Europe, U.S.A.

Betula

Cryptosporium betulinum Jaap, in Verh. Bot. Ver. Prov. Brand. lii. 149. Died. p. 850, p. 823, f. 20. *C. Neesii* var. *β*, *betulinum* Sacc. Syll. iii. 740; Fung. Ital. pl. 1094. All. vii. 744, with fig. Cf. Tul. Carp. ii. 148, pl. 17, f. 15–19.

Pustules subcutaneous, loosely gregarious, at length transversely erumpent, conical, then flattened, up to 2 mm. diam., whitish within. Spores cylindrical, 25–50 × 3·5–4μ, falcate, rounded at the ends, granular or guttulate; sporophores filiform, 15–20 × 1·5μ, soon disappearing.

On dead twigs of *Betula*. King's Cliffe; Easton; Blackheath; Sydenham; Cheshire; Derbyshire; West of England; North Yorkshire; Ayrshire; etc. Apr.–Nov.

The pycnidial stage of *Cryptospora Betulae* Tul.

Var. **Carpini**. Spores 30–45 × 3μ; otherwise like the type.

On *Carpinus Betulus*, Cheshire (Ellis). Apr.

This var. to be compared with the spermogones of *Cryptosporella aurea* Sacc., on *Carpinus*, mentioned by Saccardo (Syll. i. 467), and with *Cryptosporium amygdalinum*, *infra*.

Fr. Germ. Ital.

Carpinus

Cryptosporium amygdalinum Sacc. Syll. iii. 741. All. vii. 744. Died. 851. Mig. 610.

Pustules minute, dry, simple, at length lacerating the epidermis; contents white. Spores oblong-lanceolate, inequilateral, granular, $22 \times 8\mu$.

On bark of twigs of *Carpinus Betulus*. Darenth (Cooke). *n.v.*

The conidial stage of *Cryptosporella aurea* Sacc. According to Fuckel there are at first produced in the pustules very minute cylindrical spores, such as those which occur in many Coelomycetes mixed with the larger spores. See Sacc. Syll. i. 467.

Fr. Germ. Ital.

Eryngium

Cryptosporium crypticum, nov. comb. *Hendersonia cryptica* Cooke, in Herb. Cf. *Cylindrosporium Eryngii* Died. in Ann. Mycol. x. 486.

Pustules lanceolate-oblong, greyish, deeply sunk in the stem, covered completely by the epidermis which is slightly elevated. Spores fusoid-falcate, subacute at one or both ends, rather irregular, $15–23 \times 3\mu$; sporophores subulate, colourless, slightly longer than the spore.

On stems of *Eryngium*. Shrewsbury (Leighton). *n.ex.*

Euphorbia

Cryptosporium Euphorbiae v. Höhnel, Fragm. Myk. 988. Sacc. Syll. xxii. 1234.

Pustules scattered, round, flat, nestling beneath the epidermis, reddish-brown, $300–400\mu$ diam., opening by a pore. Spores cylindrical, rounded at both ends, slightly bent, micro-multiguttulate, colourless, eseptate, $22–26 \times 2–4\mu$; sporophores short, simple.

On stems of *Euphorbia palustris*, in a garden, Edgbaston, Birmingham (Rhodes). Mar.

The fungus was discovered by von Höhnel in Hungary on the same host-plant.

Fraxinus

Cryptosporium turgidum B. & Br. in Ann. Nat. Hist. 1881, vii. 129. *Stagonospora turgida* Sacc. Syll. iii. 447. All. vi. 974. *Cryptosporium Fraxini* Rostr. Norsk. Ascom. 1904, p. 38. Sacc. Syll. xviii. 493.

"Pustules gregarious, globose, pulvinate, rather prominent,

obtuse, fuscous, about 500μ diam. Spores fusoid-falcate, i.e. curved and acute at both ends, faintly 1- or 3-septate, 20–30 × 4–5μ; sporophores simple, about 30 × 3μ."

On twigs of *Fraxinus excelsior*. Twycross (Bloxam). *n.v.*

Description partly from Lind, Danish Fungi, p. 494, pl. 9, f. 123, pl. 8, f. 101.

"Utrinque obtusis" (in Sacc. *l.c.*) is a translation of Cooke's error in transcription (in Grevill. x. 48) from Berkeley's account. The original diagnosis says "utrinque acutis". The spore-breadth also, given by Saccardo, viz. 5μ, is not in the original, nor is the "in ramis".

Holl. Denm.

Malva

Cryptosporium Malvae Grove. ? *Rhabdospora Althaeae* Peyr.

Pustules black, 120–300μ diam., emerging by a wide pore. Spores cylindrical, arcuate or sometimes nearly straight, hyaline, eseptate, obtusely rounded at one or both ends, 16–20 × 2–3μ; pedicels linear, erect, straight, about as long as the spore, rising from a small-celled brownish parenchymatous basal layer.

On dead stems of *Malva silvestris*. Colwich, Staffs. (Rhodes).

There is no complete all-round pycnidial wall, only a basal proliferous stratum, but the pustule looks very black and shining around the irregular marginal ring which surrounds an ultimately colourless wide central area. Most of the spores take the form of about one-fifth of the periphery of a circle, like the spores of *Cr. Lonicerae* figured in Grevill. 1876, pl. 99, f. 2.

Populus

Cryptosporium coronatum Fckl. Symb. Myc. 193. Sacc. Syll. i. 468; iii. 742. All. vii. 746. Died. 852. Mig. 611. *C. Populi* Bon. Abh. i. 130. Sacc. Syll. iii. 742. *Discella coronata* Petr. in Ann. Mycol. 1921, xix. 180.

Pustules large (500μ), flat, grey, covered, then erumpent by a split, when perfect surrounded at the base within by a radiating white floccose ring. Spores oblong-fusoid, rather obtuse at both ends, not granular or only faintly so, 15–18 × 3–4μ, at length oozing out; sporophores erect, simple, fasciculate, linear, about as long as the spore.

On bark of *Populus*. Highgate (Cooke).

The pycnidial stage of *Cryptosporella populina* Sacc. (= ?*Cryptodiaporthe populina* Petr.).

The pycnospores of this species almost exactly resemble the asco-

spores. Here also there are occasionally mixed with the pycnospores Cytospora-like "spermatia" about $5 \times 1 \mu$. In a foreign specimen, labelled *Discella coronata*, the spores were somewhat allantoid, curved and measuring $20–25 \times 2–3 \mu$; in a similar one from Latvia they were of the same size, but rather oblong-falcate with an acute base.

Fr. Belg. Germ. Latvia, U.S.A.

Rosaceae

Cryptosporium minimum Laub. in Centralbl. f. Bakt. 1907, II, xix. 166, with figs. 1–3 on p. 165. Sacc. Syll. xxii. 1234. Died. 852. Mig. 611.

Spots conspicuous, round, blackish, margined with purple, at length cinereous-brown. Pustules gregarious, sunk in the cortex, minute, colourless, about 150μ diam. Spores continuous, allantoid, curvulous, hyaline, $16–27 \times 2{\cdot}2–3{\cdot}8 \mu$, issuing from the stomata in little white tendrils; sporophores simple, erect, $10–15 \times 3 \mu$.

On weakened (frost-bitten) but still living branchlets of *Rosa*. Reading, on American Pillar Rose (Buddin). May.

A fungus which was considered to be a variety of this is reported on Raspberry canes, from Yorkshire, Middlesex, Somerset, Kent, and Merthyr Tydfil. This var. grew in companies on blackish spots of the matrix, which were suborbicular, often purple-margined, and at length cinereous-brown. The pustules were blackish, each often surrounded by a separate purplish-black stain. The spores were sausage-shaped and lunate, but of the given size. Is not this var. the same as *Rhabdospora ramealis*? See Vol. I, p. 443.

Germ.

Silphium

Cryptosporium hypodermium Auersw. in Willk. Sert. Fl. Hisp. 170. Sacc. Syll. iii. 742. All. vii. 749.

Var. **Silphii** Grove, in Journ. Bot. 1922, p. 147.

No spots. Pustules gregarious, oblong or rounded, 200–250μ diam., flat, blackish, paler in the centre, at first covered by the epidermis, afterwards exposed. Spores lunate, obtuse at both ends, often broader towards the apex, hyaline, indistinctly and irregularly guttulate, $12–15 \times 2{\cdot}5–3 \mu$; sporophores short, linear, obtuse, about $5 \times 1{\cdot}5 \mu$, rising from a parenchymatous pallid-olivaceous stratum.

On dry dead stems of *Silphium perfoliatum*. Botanic Gardens, Edgbaston. Mar.

Tamus

Cryptosporium Tami Grove, in Journ. Bot. 1922, p. 147, pl. 563, f. 5.

Pustules loosely aggregated, round, somewhat flat, covered by the epidermis, 150–250μ diam., soft, very delicate, at first of a fuscous honey-colour, then pallid in the centre, surrounded by a translucent brownish margin. Spores curved, obtuse at both ends, but sometimes a little attenuated below, faintly granular or minutely guttulate, at length hyaline, $18–28 \times 2–3\mu$; sporophores linear, usually straight, as long as the spore or shorter, rising from a soft thin pallid-olivaceous basal stratum. (Fig. 114, left, p. 299.)

On dry dead stems of *Tamus communis*. Moreton Pinkney, Northamptonshire (Rhodes). Oversley Wood, Alcester, Wk. Bromsgrove and Blackwell, Ws. Mar.–May.

Distinguished from *Phomopsis tamicola*, with which it was mingled, by its soft honey-brown pustules. It belongs without doubt to the same life-cycle; ? the C-spores.

Vinca

Cryptosporium Vincae Otth, in Mitth. nat. Ges. Bern, 1868, p. 61. Sacc. Syll. xi. 585. All. vii. 749. Mig. 613.

Var. **ramulorum** Grove, in Journ. Bot. 1918, p. 342.

Pustules on the branches, densely scattered, roundish, blackish, paler in the centre, somewhat depressed, 200–300μ diam., raising the epidermis, and at length opening by a broad round pore, without any pycnidial wall. Spores sausage-shaped, curved or hooked, tapering a little to each end, hyaline, occasionally guttulate, $19–22 \times 2–2{\cdot}5\mu$; sporophores very short rising from a soft olivaceous parenchymatous layer.

On dry dead stems of *Vinca major*. Ayrshire (Boyd). Apr.

The type specimens were on leaves of that plant, in Switzerland, and had spores $27–32 \times 2{\cdot}5\mu$.

Germ. Switz.

LIBERTELLA Desm. in Ann. Sci. Nat. 1830, xix. 277, emend. Sacc.

Pustules variable in form, long covered by the epidermis or periderm, pseudolocellate below, opening in various ways above. Spores very narrow, filiform, curved or falcate, elongated, always eseptate, hyaline; sporophores various.

The species have been assigned (mostly by guess-work, without any experimental evidence) to various Pyrenomycetes, and are undoubtedly much confused.

Betula

Libertella betulina Desm. in Ann. Sci. Nat. 1830, xix. 276, pl. 5, f. 4 (*non* Tul. in Comptes Rendus). Cooke, Handb. 818. Sacc. Syll. iii. 745. All. vii. 734. Died. p. 847, p. 823, f. 17. Mig. 609. *Naemospora aurea* Fr. Syst. Myc. iii. 478.

Pustules small or expanded, at first pinkish, covered by the elevated periderm and showing through it, then divided into many tortuous chambers, rich golden-yellow. Spores yellow in mass, fusoid, faintly curved, pointed at both ends, 13–16 × 0·75–1 μ (14 μ Desm.), issuing in golden-yellow tendrils; sporophores crowded, simple, acicular, nearly straight, about as long as the spore.

On dry bark of *Betula*. Surrey; Worcestershire; Birmingham; Staffordshire; Glamis; etc.

Said by Tulasne (Carp. ii. 119) to be a pycnidial stage of his *Melanconis stilbostoma*. But there is much more reason to believe that it belongs to *Diatrype Stigma* Fr. See pp. 260–1.

Europe, N. America.

Fagus

Libertella faginea Desm. in Ann. Sci. Nat. 1830, xix. 276, pl. 5, f. 5; Crypt. France, ser. 1, no. 707. ? Sacc. Syll. iii. 744; Fung. Ital. pl. 1085. Tul. Carp. ii. 104, pl. 12, f. 17–20. All. vii. 735, with fig. Died. p. 848, p. 823, f. 18 (incorrect). Mig. 609. *Naemospora crocea* Moug. & Nestl. Stirp. Vog.-Rhen. 1811, ii, no. 177. Fres. Beitr. pl. 4, f. 35–39. Fr. Syst. Myc. iii. 479. Cooke, Handb. 472. (*Non* Sacc.)

Pustules varying much in form, small but often confluent, covered by the periderm but showing their colour through it, opening by minute pores; fertile stratum radiately sulcate,

golden-yellow, often surrounded by a white zone of mycelium. Spores very delicately filiform-fusoid, curved, 17–26 × 0·5–0·75, issuing in very long highly gelatinous, coiled and twisted, saffron-yellow or orange tendrils; sporophores crowded, about as long as the spore. (Fig. 115 *a*, *b*.)

On trunks and branches of *Fagus silvatica*. Very common in Great Britain wherever the Beech grows.

Summer and autumn.

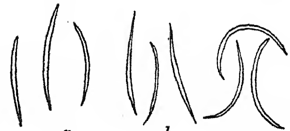

Fig. 115. *Libertella*: *a*, *L. faginea*, from Desmazières' specimen, ser. 1, no. 707; *b*, the same, from Kew Gardens; *c*, *L. dissepta*; spores, all × 600.

The pycnidial stage of *Quaternaria Persoonii* Tul. (*Q. quaternata*).

Desmazières figures the spores as arcuate and about 16–17 μ long, which agrees with his exsiccatum (no. 707). Tulasne gives the length of his "spermatia" in the text (p. 104) as 16–20 μ, while his drawing (f. 20) represents them as between 13 and 18 μ. Now Saccardo mentions (*l.c.*) a form (*minor*) of *L. faginea* on *Fagus* with spores 18–25 × 1 μ, which agrees with what Desmazières intended to be the typical species. Therefore Saccardo obviously is wrong when he gives the size of the spores of *L. faginea* Desm. (in Syll. iii. 744) as typically 30–35 × 2 μ.

I suggest that, if Tulasne is right in his description of the pycnidial stage of *Diatrypella verruciformis* Nits. on *Betula* (Carp. ii. 100), which also occurs on *Fagus*, it may be that fungus that Saccardo had before him. For Tulasne gives the pycnospores of that ascomycete as a Libertella with strongly curved spores measuring about 40 μ long, although if they had been on *Quercus* Saccardo's long spores would have served equally well for *Libertella quercina* Grove, *q.v. infra*. In a specimen labelled "Saccardo, Mycotheca Veneta, no. 1394, *Libertella faginea*" no spores could be found, but the external appearance was quite unlike Desmazières' specimen.

Europe, N. America.

Genista

Libertella alba Lamb. Fl. Myc. Belg. iii. 183. Sacc. Syll. iii. 746. All. vii. 734. *Naemospora alba* Lib. Exs. no. 364.

"Pustules covered, bullate, erumpent by a fissure, fuscous without, whitish flesh-coloured within. Spores fusoid, curved, obtuse at both ends, 40–60 × 5 μ, issuing in a white twisted tendril which at length becomes flesh-coloured."

This is recorded on *Genista tinctoria* var. *elatior*, Kew Gardens. *n.v.*

It is usually stated to grow on dead branches of *Alnus glutinosa*, and a specimen on that host, in Herb. Kew, gathered by Cooke at

Highgate, is so named "*L. alba*"; it is, however, merely young *Cryptosporium Neesii*, as Saccardo suspected *L. alba* to be, having fusoid arcuate spores, about 30 × 2–3 μ. What the fungus on *Genista* was, can never be ascertained, as no specimen is preserved.

Belg. Holl.

Quercus

Libertella Taleola Sacc. Syll. iii. 745. All. vii. 737. Cf. Tul. Carp. ii. 168.

Pustules gregarious, roundish, rather flat, chestnut-brown, pinkish or flesh-coloured within, often limited by a black line. Spores cylindrical, curved or arcuate, somewhat acute at both ends, 20–30 × 4–5 μ.

On bark of twigs of *Quercus*. Kew Gardens; Oscott College; etc.

These may be called the C-spores of *Diaporthe* (*Chor.*) *Taleola* Sacc. They do not really belong to Libertella, but at present there is no better place to receive them. The spores called *Myxosporium Taleola* (*q.v.* p. 254) frequently occur in company with them. Currey and also Fuckel found them both together, and we evidently have in *D. Taleola* a species resembling *D. leiphaemia* in its variable imperfect stages which no taxonomic devices can reduce to the usual tame orderliness. The black line belongs to the Diaporthe, which deserves to be placed in a distinct genus or section.

Fr. Ital. U.S.A.

Libertella quercina, sp. nov. See Tul. Carp. ii. 98, pl. 12, f. 12–15 (without a name attached).

Pustules small, flat or somewhat conical, 3- or 4-angled, black; hymenial surface marked with labyrinthiform (reticulated) grooves, at first pale-cinereous, then smeared over with the golden-yellow stratum of spores. Spores abundant, slender, strongly arcuate, 35 μ long or more, exuding as bright-golden tendrils.

On bark of *Quercus*. Probably as abundant in England as Tulasne found it around Paris and Versailles.

The pycnidial stage of *Diatrypella quercina* Nits. It has been obtained in monascospore cultures from *D. quercina* collected near Birmingham.

Ribes

Libertella Ribis A. L. Smith, in Journ. Roy. Micr. Soc. 1900, p. 424, pl. 3, f. 6; and in T.B.M.S. 1901, i. 155. Sacc. Syll. xvi. 1020. All. vii. 738.

"Pustules beneath the outer bark, lens-shaped, perforating the cuticle [*sic*]. Spores falcate, much curved, 30–40 × 1 μ, extruded in pinkish gelatinous tendrils."

On branches of *Ribes rubrum*. Seamill, Ayrshire (Boyd). *n.v.* Oct.

This might be the same as *Cytosporina Ribis* Magn., which is probably the B-spores of a Phomopsis; see Vol. I, p. 452.

Rosaceae

Libertella Rosae Desm. in Ann. Sci. Nat. 1830, xix. 277, pl. 5, f. 6. Sacc. Syll. iii. 745; Fung. Ital. pl. 1084. All. vii. 739 with fig. Died. 849. Mig. p. 609, pl. 88, f. 9–12. *Naemospora Rosae* Fr. Syst. Myc. iii. 479. Cooke, Handb. 473.

Pustules of various shapes, often confluent, immersed, bright reddish-orange. Spores filiform, arcuate, 10–18 × 1 μ; sporophores straight, cylindrical, about as long as the spore.

On flagging or dead branches of *Rosa*. King's Cliffe; Kew; Yorkshire; Berwick; etc.

In herbaria other species, such as the B-spores of *Phomopsis incarcerata*, have been referred to this by Berkeley and Cooke. Desmazières figures the spores as narrow-fusoid, bent into the form of a semicircle, acute at each end, and about 20 μ long.

Fr. Germ. Ital.

Libertella blepharis A. L. Smith, in Journ. Roy. Micr. Soc. 1900, p. 423, pl. 3, f. 4; T.B.M.S. 1901, i. 155. Sacc. Syll. xvi. 1020, 1155. All. vii. 737. *L. corticola* Smith, *ibid.* p. 424, f. 5. Syll. xvi. 1020.

Pustules seated in the inner bark, about 600 μ diam., at length widely open, whitish within. Spores filiform, curved, arcuate or falcate, 25–40 × 1–1·5 μ, forming when extruded a milk-white layer outside the bark; sporophores erect, slender, branched, shorter than the spore.

Recorded by Miss Smith on dead branches of various Rosaceae, e.g. *Prunus Cerasus*, *Pyrus Malus*, *P. communis*; and by Mr Boyd on *Crataegus Oxyacantha* in Scotland. Sept.–Mar.

Pustules up to 750 μ broad, raising the paler bark above them in a conical fashion, but at length splitting it and disclosing a milk-white disc. *L. corticola* has slightly smaller less curved spores, but is otherwise alike, probably younger. I think, however, that they may both be merely the B-spores of the respective Phomopses.

Salix

Libertella Salicis A. L. Smith, in Journ. Roy. Micr. Soc. 1900, p. 424, pl. 3, f. 7; T.B.M.S. 1901, i. 155. Sacc. Syll. xvi. 1021. All. vii. 739.

"Pustules seated in the bark, convex or angular, slightly elevated. Spores somewhat curved, $25–35 \times 1{\cdot}5\mu$."

On dead branches of *Salix cinerea*. West Kilbride, Ayrshire (Boyd). Autumn.

? The B-spores of a Phomopsis. Cf. also *Septomyxa Salicis*, *supra*, p. 285.

Ulmus

Libertella dissepta Trav. Flor. Ital. Crypt. II, i. 79 (1906). *Rabenhorstia ulmaria* Otth, as quoted in Tul. Carp. ii. 107, possibly.

Pustules in groups, immersed, convex, protruding. Spores innumerable, equably filiform, singly colourless, curved so as to form one-half or two-thirds of the circumference of a circle, or with straighter ends so as to have rather the shape of a wide croquet hoop, $25–40 \times 1–1{\cdot}5\mu$, exuding as thick golden-yellow or reddish tendrils. (Fig. 115*c*, p. 305.)

On twigs of *Ulmus montana*, Forhill, Ws. (Chesters). On branches and trunks of *Ulmus campestris*, Westwood Park, near Droitwich, and Piper's Hill Common, Ws. Dec.–Apr.

The pycnidial stage of *Quaternaria dissepta* Tul. In my specimens the beginnings of asci were interspersed among the pycnospores. No doubt common, though it seems to be rarely observed.

Libertella Ulmi-suberosae Oud. in Hedwig. 1898, xxxvii. 180. Smith & Ramsb. in T.B.M.S. 1913, iv. 180. Sacc. Syll. xvi. 1022. All. vii. 740.

"Pustules scattered or gregarious, immersed in the outer bark, depressed-conical, surrounded by a dark cellular tissue somewhat like a pycnidium; contents white. Spores filiform, curved or hooked, very slender, $25–50 \times 1{\cdot}2\mu$; sporophores seen in large numbers, almost straight, each supporting a single spore."

On branches of *Ulmus*. West Kilbride, Ayrshire (Boyd). Aug.

The mere reading of this description suggests at once that it really belongs to the B-spores of a Phomopsis, probably *P. oblonga*. Holl.

Viburnum

Libertella Opuli Oud. Contr. Flor. Myc. Pays-Bas, xvii. 295. Sacc. Syll. xvi. 1021. All. vii. 741. Grove, in Journ. Bot. 1918, p. 342, pl. 550, f. 14.

Pustules scattered, covered, elliptic or oblong, about 500μ long, orange-yellow. Spores cylindrical, curved, rounded at both ends or more tapering below, 15–20 $\times$ 2μ; sporophores filiform, about as long as the spore.

On thin twigs of *Viburnum Opulus*. Cheshire (Ellis). Feb.

Oudemans says that the spores escape in pallid-orange heaps. Holl.

Libertella fusispora Mass. & Crossl. ? *ined.*

On a rotting hearth-rug, composed of cloth-tabs. Hebden Bridge, Mar. 1897 (Naturalist, 1904, p. 360). "Oozing out in very delicate agglutinated tendrils, composed of minute fusiform conidia." No other description seems to have been published.

A species of Libertella (*L. favacea* Trav.) has been found to occur in the life-history of *Diatrypella favacea* Nits. In fact, it is probable that all (or most) of the species of Diatrype and Diatrypella have pycnidial stages belonging to Naemospora and Libertella, and it is possible that the so-called Naemospora stage is either a young state, or at any rate an antecedent, of the corresponding Libertella; though this is not certain, since intermediate forms between Naemospora and Libertella seem to be seldom present.

PHAEOSPERMAE

Spores more or less coloured.

I. Spores continuous (PHAEOSPORAE).

- A. Spores standing singly on each sporophore.
  - 1. Pustules immersed at first; spores ovoid-oblong (excluding *Coniosporium*) *Melanconium*
  - 2. Pustules nearly superficial; spores fusoid . *Cryptomela*
- B. Spores forming a head or cluster on a pedicel . *Thyrsidium*

II. Spores 1-septate, oblong (PHAEODIDYMAE).

- A. Spores bluish . . . . *Lamproconium*
- B. Spores brown or blackish . . . . . . [*Didymosporium*]

III. Spores pluriseptate (PHAEOPHRAGMIAE).

- A. Spores without appendages.
  - 1. Spores single, not beaked.
    - *a*. Pustules ± globular, remaining long covered.
      - † Spores pyriform . . . . *Stilbospora*
      - †† Spores fusoid, straight . . . . . . *Coryneopsis*
    - *b*. Pustules discoid, solid, soon uncovered . *Coryneum*
  - 2. Spores single, beaked.
    - *a*. Spores 3–5-septate . . . . *Toxosporium*
    - *b*. Spores at length 5–11-septate . . . *Scolecosporium*
  - 3. Spores collected in stellate clusters . . *Asterosporium*
  - 4. Spores in chains . . . . *Septotrullula*
- B. Spores with filiform appendages.
  - 1. Appendages all apical.
    - *a*. One appendage only . . . . *Monochaetia*
    - *b*. Several appendages . . . . *Pestalotia*
  - 2. Appendages at both ends.
    - *a*. Two appendages at each end . . . . *Diploceras*
    - *b*. One appendage or one at each end . *Amphichaeta*

IV. Spores muriform (PHAEODICTYAE).

- A. Spores single on each sporophore . . . . *Steganosporium*
- B. Spores in chains . . . . [*Phragmotrichum*]

MELANCONIUM Link, in Linn. Sp. Pl. ed. 4, vol. vi, part 2, p. 89.

Pustules covered by the epidermis or periderm, varying from conical and prominent to nearly flat and discoid, black. Spores subglobose to oblong or subfusoid, eseptate, always colourless when young, then dusky-brown or dark olivaceous-brown, produced singly on simple or branched sporophores which are usually rather elongated, at length pouring forth and staining the matrix around the pustules.

Most of the species occur on the twigs or branches of trees; some of them are known to be pycnidial stages of *Melanconis* or *Melanconiella*. See Grove, in Kew Bulletin, 1918, pp. 161–178, with figs.

Alnus

Melanconium apiocarpum Link, Sp. Pl. ii. 90 (1825). Sacc. Syll. iii. 755. All. vii. 570. Died. 856. Mig. 561. Grove, in Kew Bull. 1918, p. 166, f. 5. *M. sphaeroideum* Link, *l.c.* p. 92, *p.p.* Sacc. Fung. Ital. pl. 1079. All. vii. 568, with fig. Died. 855. Mig. p. 562, pl. 72, f. 4–7. Tul. Carp. ii. 123, pl. 21, f. 22. *M. didymoideum* Vestergr. in Hedwig. 1903, xlii. 82. Grove, *l.c.* f. 5 *a*.

Pustules rather small, globose-conical, long covered by the swollen epidermis, black with a white central columella. Spores oblong or obovoid, obtuse at both ends, especially above, with one or two guttules, smoky-brown, rather pellucid, $10–13 \times 6–7\mu$; sporophores linear, longer than the spore. (Fig. 116 *d*, *e*.)

On bark of *Alnus* spp. Common: England, Wales, Scotland.

The pycnidial stage of *Melanconis Alni* Tul.

The spores have often been described as 1-septate; this is due to an illusion produced by a flat side of an excentric angular guttule, and has led to the name *didymoideum*. See Kew Bulletin, *l.c.* With the Melanconium spores are mixed sometimes Cytospora-like spores, $6{\cdot}5–8 \times 1{\cdot}5\mu$; see Tulasne's fig. 22 (*l.c.*).

Europe.

Betula

Melanconium betulinum K. & S. Crypt. Exs. no. 208 (1880). Sacc. Syll. iii. 756; Fung. Ital. pl. 1082. All. vii. 572, with fig. Died. p. 857, p. 823, f. 21. Mig. p. 562, pl. 77, f. 11–14. Grove, in Kew Bull. 1918, p. 162, f. 3. *Didymosporium betulinum* Grev. Scot. Cr.

Flor. pl. 273. *Melanconium pyriforme* Preuss, Fung. Hoyersw. no. 45. Sacc. Syll. iii. 755. *M. elevatum* Cord. Ic. Fung. iii. 22, f. 60. Sacc. Syll. iii. 753. All. vii. 582.

Pustules arising beneath the periderm, black, conico-discoid, but often oblong or linear-lanceolate, then dehiscing by a very narrow transverse fissure. Spores mostly narrowly ellipsoid or rather almond-shaped, slightly pointed below, somewhat thick-walled, dark smoky-brown, granular or 1-guttulate, rather opaque, $13–18 \times 5–6·5\mu$; sporophores hyaline or faintly coloured, slender, three or four times as long as the spore, $1·5–2·5\mu$ wide. (Fig. 116 *b*.)

On dead bark of *Betula alba*, *B. verrucosa*. Twycross (Berk.). Spye Park, Wilts. (Broome). Roslin Woods (Greville). Weybridge (Curtis). Kew; Oxfordshire; Cambridge; Worcestershire; Salop; Cheshire; Wales; etc.

This species seems to differ but slightly from *M. bicolor*, and it would be best to unite them under that name.

Europe, N. America.

Melanconium bicolor Nees, Syst. Pilz. p. 32, pl. 2, f. 27 (1817). Corda, Ic. Fung. i. 2, f. 33. Cooke, Handb. pp. 466, 818, f. 178. Sacc. Syll. iii. 755. All. vii. 571. Died. p. 857, p. 823, f. 20. Mig. 562. Tul. Carp. ii. 120, pl. 14, f. 4. Grove, in Kew Bull. 1918, p. 162, f. 1.

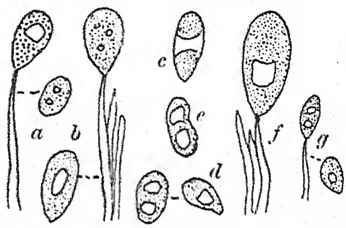

Fig. 116. *Melanconium*: *a*, *M. bicolor*; *b*, *M. betulinum*; *c*, *M. zonatum*; *d*, *M. apiocarpum*; *e*, var. *didymoideum*; *f*, *M. magnum*; *g*, *M. Hederae*; spores, all $\times 600$.

Pustules elevated, conical, prominent, at first white within; mass of spores black, generally with a white "eye". Spores compact, ovoid or obovoid, olive-brown, not opaque, usually 1-guttulate, $10–12 \times 6–8\mu$; sporophores hyaline, crowded, linear, erect, but not quite straight, $25–30 \times 1·5–2\mu$. (Fig. 116 *a*.)

On bark of *Betula*, but said to occur abroad also on *Quercus* (even on acorns) and *Corylus*. Common all over the British Isles.

M. bicolor and *M. betulinum* on Birch (taken together) form the chief pycnidial stage of *Melanconis stilbostoma* Tul., the other being said to be *Libertella betulina* Desm. Tulasne also shows (pl. 14, f. 4)

Naemospora-like spores, about 7–12 μ long, growing side by side with the Melanconium spores in the same pycnidium of *Melanconis stilbostoma*.

Europe, N. America.

Melanconium zonatum Ell. & Ev. in Peck, 44th Report N.Y. State Mus. 1890, p. 136. Sacc. Syll. x. 472. Grove, in Kew Bull. 1918, p. 164, f. 3.

Pustules scattered, black, round, about 1 mm. diam., slightly elevated and erumpent in a depressed-conical form, the small whitish stroma hardly ever visible. Spores ovoid or oblong, faintly curved when seen in profile, rounded above, at times somewhat pointed below, dusky-brown, marked across the middle by a paler semi-pellucid zone, 10–12 $\times$ 7–8 μ. (Fig. 116 *c.*)

On bark of *Betula* (Herb. Berk. no. 1574), mixed with Libertella; Selby, Yorkshire. Berkeley's specimen is not localised, but is also probably British.

It is very like the American specimens, which are on *Ostrya*, but it also resembles *M. bicolor*, being in fact intermediate between the two. The clear median zone appears to be due, not to a guttule, but to a vacuolar space. The species would be better placed as a var. of *M. bicolor*.

U.S.A.

Carpinus

Melanconium magnum Berk. Outl. 324 (1860). Cooke, Handb. 466. Sacc. Syll. iii. 753. All. vii. 568. Died. 855. Mig. 561. *Naemospora magna* Grev. Scot. Cr. Fl. pl. 349. *Stilbospora magna* Berk. Engl. F. v. 357, *p.p.* *Sphaeria carpina* [*sic*] Sow. pl. 376 (1803). See Grove, in Kew Bull. 1918, p. 167.

Pustules gregarious, flattish or bluntly conical, about 2 mm. diam., black, sometimes extending over the whole trunk. Spores ovoid or oblong, thick-walled, dark greyish-brown, sometimes almost opaque, with one central guttule or several, more or less granular within, 20–25 $\times$ 10–11 μ, but reaching as much as 37 $\times$ 15 μ, at length oozing out in large broad flat black masses or entangled tendrils, which ultimately become hard and carbonaceous. (Fig. 116 *f.*)

On branches of *Carpinus*. Hainault Forest, Essex (Sowerby). Epping Forest (Cooke). Edinburgh, etc.

Said to be the pycnidial stage of *Melanconis macrosperma* Tul. The records on *Juglans* no doubt belong to *Melanconium juglandinum*, but it is recorded in other European countries on *Acer*, and an effused form from the U.S.A. on *Acer* has spores 30–35 × 17–18 μ. See Kew Bull. *l.c.* p. 168, f. 6 *a* for this, and cf. *Stilbospora angustata*, p. 324, and *Melanconium stromaticum*, *infra*.

Western Europe, N. America.

Melanconium stromaticum Corda, Ic. Fung. i. 3. Sacc. Syll. iii. 750, *p.p.* All. vii. 573, with fig. Died. p. 858, p. 823, f. 28. Mig. 563. Grove, in Kew Bull. 1918, p. 165, f. 4. *Dapsilosporium stromaticum* Corda, in Sturm's Deutsch. Flor. iii. 75, f. 38. *M. bicolor*, var. *ramulorum* Corda, Ic. i. 2, f. 34, *p.p.* Sacc. Syll. iii. 754; Fung. Ital. pl. 1078. *M. ramulorum* All. vii. 573, with fig. on p. 574. Died. 858. Mig. 563. *M. spodiaeum* Mig. (under *Melanconis spodiaea*, Ascom. i. 621).

Pustules scattered, covered by the bark, circular, depressed, sometimes almost flat, but dehiscing by a round protruding pore in the centre, 0·5–1·5 mm. diam., black, showing through the covering layer; stroma white, usually not visible externally. Spores oblong to obovoid, with one or more guttules, often apiculate below, fuliginous, rather granular, 10–16 × 6–7 μ, issuing in tendrils, but at length effused around the pore as a black stain; sporophores linear, obtuse, 20–40 × 2·5 μ.

On dead twigs and branches of *Carpinus Betulus*, but occasionally I have found it on living twigs. Epping Forest; Warwickshire; Worcestershire; Suffolk; Edinburgh; Glasgow; etc.

The pycnidial stage of *Melanconiella spodiaea* (Tul.) Sacc. The basal apiculus is sometimes paler than the spore. See Tulasne, Carp. ii. 127, pl. 24, f. 12, which is a good figure. In view of the confusion which has arisen about this species, it would be well if Migula's suggestion of *spodiaeum* could be adopted. With the Melanconium Tulasne found a second pycnidial stage which is now known as *Myxosporium deplanatum* Sacc. (*q.v. supra*, p. 249).

Europe.

Melanconium ramulorum Corda, Ic. Fung. i. 2, f. 34, *p.p.* Raben. Herb. Mycol. ed. 2, no. 590 *b*. Tul. Carp. ii. 125, pl. 24, f. 16. (*Non* Sacc., *nec* All., *nec* Died., *nec* Mig.)

Pustules scattered, covered by the bark, truncate-conoid, black. Spores broadly obovoid, sometimes tapering below,

guttulate, fuliginous-black, 13–15 × 10–10·5μ; sporophores filiform, as long as the spore or longer, rising from an olivaceous or yellowish-green stratum.

On bark of branches of *Carpinus Betulus*. King's Cliffe; Jedburgh.

The pycnidial stage of *Melanconis xanthostroma* Schröt. = *M. chrysostroma* Tul., by which it is accompanied. With it Tulasne found also the second pycnidial stage, for which see *Myxosporium Carpini* Grove, *supra*, p. 248.

Fr. Germ. Bohem. etc.

Fagus

Melanconium ovatum Link, Sp. Pl. ii. 89, *p.p.* Sacc. Syll. iii. 758. All. vii. 586. Mig. 566. Grove, in Kew Bull. 1918, p. 168, f. 7. *Stilbospora ovata* Pers. Obs. Mycol. i. 31, pl. 2, f. 2; Syn. meth. 96. Grev. Scot. Cr. Flor. pl. 212, f. 2, *p.p.*; (*non* Cooke, Handb. 468, *nec* Berk. Eng. Fl. v. 357).

Pustules scattered, covered, flatly conical, 1–2 mm. diam., then erumpent by a slit, black. Spores oval, more or less attenuated at the base, i.e. pyriform, but also ovoid or oblong, dark smoky-brown, semi-opaque, 20–25 × 10–12μ; sporophores long and branched.

On bark of *Fagus silvatica*. Batheaston (Broome). Edinburgh (Greville). Oct.

Allied to *M. magnum*, but distinguished by its often distinctly pyriform spores. It has, in consequence, sometimes been confused with young *Steganosporium pyriforme*. Tulasne cites it as a pycnidial stage of his *Melanconis carthusiana* (on Juglans), but it is a species about which great uncertainty exists.

Fr. Holl. Germ.

Hedera

Melanconium Hederae Preuss, Pilz. Hoyersw. no. 312, in Linnaea, 1855, xxvi. 717. Sacc. Syll. iii. 751. All. vii. 576. Died. 860. Mig. 563. Grove, in Kew Bull. 1918, p. 169, f. 8. *M. microspermum* Nees, Syst. Pilz. p. 32, *p.p.* Sacc. Syll. iii. 751, *quoad in Hedera*. Fckl. Fung. Rhen. no. 2106. *Phoma Hederae* Desm. Pl. Crypt. no. 350. Cooke, Handb. 418. *Coniothyrium Hederae* Sacc. Syll. iii. 307. All. vii. 39.

Pustules scattered or crowded, oblong or oval, 300–950μ diam., seated in the cortex, covered by the blackened epidermis, somewhat prominent, black, opening by a pore which becomes widely torn. Spores oval or obovoid, colourless, then brown or olivaceous-black, usually 1-guttulate, 6–8 × 3–5μ;

sporophores linear, obtuse, colourless, irregular, flexuous, 10–15 × 1·5–2·5μ. (Fig. 116 *g*.)

On small dead shoots of *Hedera Helix*, or rarely on the leaves. Common all over Britain, as far north as Aberdeen. Jan.–Dec.

Sometimes, under a low magnification, the black mass of spores simulates an ostiolate pycnidium; it may then easily be mistaken at first sight for *Phomopsis pulla* on the same host.

It has been frequently confused with *Coniothyrium olivaceum* var. *Hederae*. On the leaves it is smaller and rounder and more like a *Coniothyrium*, but still is without a true peridium, having only the discoloured epidermis above and a proliferous stratum below. In spite of these differences the similarity of the spores is so great, that it is not inconceivable that the two belong to the same life-cycle.

Fr. Belg. Holl. Germ. Denm. Austr. Ital.

Juglans

Melanconium juglandinum Kunze, *apud* Ficinus, Flor. Dresd. ed. 2, ii. 260 (1823). Sacc. Syll. iii. 753; Fung. Ital. pl. 1081. All. vii. 577, with fig. Died. p. 860, p. 823, f. 24. Mig. p. 563, pl. 78, f. 1–4. Grove in Kew Bull. 1918, p. 168, f. 6. *M. Juglandis* Cord. Ic. Fung. iii. 21, f. 58, 59.

Pustules gregarious, covered by the bark, somewhat prominent, depressed-conical, 1–2 mm. diam., black, seated on a yellowish stroma. Spores ellipsoid to ovoid, at first quite colourless, then dark smoky-brown, semi-pellucid, granular within, occasionally slightly curved, 18–20 × 12–14μ, but reaching even to 25 × 15μ, with usually one large guttule or several small ones, soon issuing in little masses or in large very black tendrils; sporophores very long, colourless, irregular, simple or forked, 1·5–2·5μ thick.

On dying branches of *Juglans regia*. Kew; Oxford; Gopsall; Milton; Warwickshire; Worcestershire; Hereford; Scotland; etc. Nov.–May.

The pycnidial stage of *Melanconis carthusiana* Tul.

M. juglandinum can attack living branches of old Walnut trees, and kill them; it often occurs in large quantity. An effused form (f. *diffusa* Corda, *l.c.* f. 59) is said to occur with the type, but this state is due merely to the weather; the rain beats down the tendrils, and the spores being embedded in a mucilaginous substance adhere widely to the bark.

M. juglandinum is very similar to *M. magnum*, and is perhaps not really distinct; all attempts to distinguish them morphologically

seem to fail. *M. oblongum* Berk. (Sacc. Syll. iii. 752), an American species which has been found on *Juglans* in Denmark, appears to be the same.

Europe, U.S.A.

Pandanus

Melanconium Pandani Lév. in Ann. Sci. Nat. 1845, iii. 66. Sacc. Syll. iii. 759; Fung. Ital. pl. 1077. All. vii. 579, with fig. Died. 861. Grove, in Kew Bull. 1918, p. 170, f. 9.

Pustules large, compound, tubercular, embedded in the bark, erumpent, rather thick, prominent, black, 1–2 mm. diam. or more, often grouped in lines. Spores very numerous, oblong or ellipsoid, singly very pale olive, dark-olive in mass, often slightly curved in profile, rarely with one or two very minute guttules, $5–9 \times 3–3{\cdot}5\mu$, involved in mucilage and oozing out in the form of tendrils which ultimately blacken the surface of the bark; sporophores linear, not much longer than the spore.

On bark of cultivated *Pandanus*. Kew Gardens; Dublin Botanic Garden; etc.

Recorded on the Continent on the leaves also, but on them the pedicels are said to be branched and longer ($40–50\mu$). If the disease is neglected, the plants soon die as the fungus spreads rapidly.

Fr. Germ.

EXCLUDED SPECIES

Melanconium Rusci Cooke & Mass. in Grevill. xvii. 3. Sacc. Syll. x. 473. All. vii. 582.

"Pustules scattered, orbicular, erumpent, covered by the lacerated brown cuticle. Conidia elliptical, continuous, sooty-olive, $12 \times 7–8\mu$" (C. & M.).

"On phyllodes [*sic*] of *Ruscus aculeatus*. Kew. This cannot be a form of *Sphaeropsis Rusci*, for there is no perithecium, and the pustules are scattered and solitary" (C. & M.).

An undoubted error. Whatever they may be, the specimens are not a *Melanconium*, and probably not a fungus at all.

Melanconium elevatum, recorded on *Quercus* from Langridge, in Grevill. xiv. 126, turns out on examination to be *Dichomera Saubinetii*.

Melanconium sphaerospermum Link (Cooke, Handb. 467) on *Phragmites*, with all its closely allied forms on the reed-like grasses, is now excluded altogether from the Coelomycetes. But as it has long

been regarded as a member of this group and is itself of considerable interest, a description and figure of it will be given here under the hyphomycetous genus to which it is best referred, viz:

CONIOSPORIUM Sacc. in Mich. ii. 21, 124 (1880), *p.p.*

Gramineae

Coniosporium sphaerospermum (Pers.) Mason. *Stilbospora sphaerosperma* Pers. Obs. Mycol. p. 31, pl. 1, f. 6 (1796); Syn. meth. 97.

(As Hyphomycete): *Gymnosporium Arundinis* Corda, Ic. Fung. ii. 1, f. 1 (1838). *Coniosporium Arundinis* Sacc. Syll. iv. 243. Lindau, viii. 555. *G. inquinans* Berk. Pl. Port. Welw. 7. *Papularia Arundinis* Fr. Summ. Veg. Scand. 509 (1849).

(As Coelomycete): *Melanconium sphaerospermum* Link, Sp. Pl. ii. 91 (1825). Cooke, Handb. 467. Sacc. Syll. iii. 759; Fung. Ital. pl. 1080. All. vii. 570, with fig. Died. p. 862, p. 823, f. 27. Mig. p. 564, pl. 77, f. 8–10. Grove, in Kew Bull. 1918, pp. 171–6, f. 11 (in the subgenus *Ectoconium*).

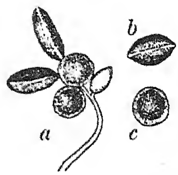

Fig. 117. *Coniosporium sphaerospermum*: *a*, fertile hypha, bearing spores in acropetal succession (from a culture), after Mason; *b*, a spore, seen edgeways; *c*, a spore in face view; all ×600.

Tufts compact, oblong or linear, 1–2 mm. or more long, black or blackish-brown, covered by the swollen epidermis which is often cleft longitudinally and soon breaks up into fragments. Spores of the shape of a biconvex lens, circular in face view, flattened in profile, 8–12μ wide, 3–6μ thick, at first olivaceous, but when mature dark-brown in the centre and surrounded in face view by a paler semi-translucent zone, usually not at all guttulate, at length dispersed in a loose powdery layer. (Fig. 117.)

On dead culms of *Phragmites communis* and *Psamma arenaria*. Common: Essex; King's Lynn; Cambridgeshire; Lancashire; Northamptonshire; Warwickshire; Ayrshire; Glasgow; etc. Jun.–Apr.

It is world-wide in its distribution, and has had numerous other names conferred upon it. The forms *inquinans* and *rhizophilum* which have, not circular, but ovoid or irregular spores, 6–8μ wide, also occur in Britain on the same and other related hosts, e.g. var. *rhizophilum*, on roots of *Triticum repens* in Norfolk, and a close ally, viz. f. *Bambusae* Sacc., is to be found frequently on damp bamboo-canes left lying on the ground in gardens. See Grove, in Kew Bull. *l.c.* for the definition of the varieties mentioned above, and E. W. Mason,

in his Annotated Account of Fungi received at the Imperial Mycological Institute at Kew, List II, 1933, pp. 15–25, f. 8, for a review of the whole involved problem which had reached a phenomenal and even deadly confusion.

CRYPTOMELA Sacc. Syll. iii. 760.

Pustules subepidermal or at length erumpent, small, black. Spores fusoid, often curved, blackish.

Typha

Cryptomela Typhae Died. 865. *Melanconium Typhae* Peck, in Bot. Gazette, 1881, vi. 275. Sacc. Syll. iii. 759. All. vii. 584. *Fusella Typhae* Lindau, Krypt. Flor. viii. 566, with fig.

Pustules scattered, oblong, flat, black, up to about 500μ long, covered by the thin epidermis only. Spores fusoid, acute at both ends, almost always straight, dusky-olivaceous, uni- or bi-guttulate, 10–16 × 3–3·5μ; sporophores linear, straight, simple, erect, parallel, crowded, colourless, about as long as or longer than the spore and 1·5–2μ wide, rising from a thin flat dark-olivaceous, minutely parenchymatous, stratum. (Fig. 118.)

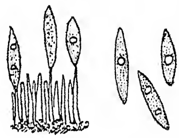

Fig. 118. *Cryptomela Typhae*: spores and sporophores, × 600.

On dead stems and leaf-bases of *Typha latifolia*. Landulph, Saltash, Cornwall (C. P. Hurst). May, 1934.

In these specimens the pedicels did not fall off while still attached to the spore, as Peck relates of his.

Germ. U.S.A.

Cryptomela atra Sacc. on *Carex* should also be found in Britain; its coloured spores are curved and measure 8–10μ in length. But the British specimens called "*Cryptomela Caricis*" by Berkeley, and by Cooke (in Grevill. xiv. 127), do not belong to that genus, but to *Leptothyrium subtectum* Sacc. (*q.v.* p. 176), having nearly colourless spores which measure 16–20 × 3μ. There is, however, a species described by Corda, *Cryptosporium Caricis*, whose spores are said to be "durchsichtig und braun" which may be worth considering in that connexion when further specimens are discovered.

THYRSIDIUM Mont. in Ann. Sci. Nat. vi. 338; Flor. Alg. i. 325.

Stroma gelatinous, immersed, then erumpent by raising and tearing the epidermis or periderm, which is coloured black. Spores roundish, fuscous-olive, but somewhat translucent, united in the form of long chains; sporophores long, filiform, hyaline, slender, branched, scarcely septate, forming dense bundles, but pointing in various directions so as to make with the spores and their enveloping mucus a mass of roundish swollen heads.

This genus is in dispute. Our two so-called species are found also in Germany, but Diedicke (p. 865) assigns them without hesitation to the Hyphomycetes, and excludes them from his work. Lindau, however, does not include them in his Hyphomycetes (Kryptogamen-Flora von Deutschland, 1907–10), and so between two stools they fall to the ground. I incline to agree with Diedicke. Still, for completeness' sake, the two species are included here, since hitherto they have always been reckoned by British authors among the Melanconiales. If a workable distinction between the Hyphomycetes and the Coelomycetes cannot be discovered, the remedy is to include the debatable species in both of the groups—not, in neither.

Plurivorous

Thyrsidium botryosporum Sacc. Syll. iii. 762; Fung. Ital. 1100. All. vii. 591, with fig. Died. 865. Mig. p. 569, pl. 79, f. 6–9. *Stilbospora botryospora* Mont. in Ann. Sci. Nat. 1836, vi. 338, pl. 18, f. 5; and Syll. Crypt. 310 (1856). *Stilbospora cheirospora* Fr. Syst. Myc. iii. 484 (1829)? *Cheirospora botryospora* Fr. Summ. Veg. Scand. 499 (1849). Cooke, Handb. p. 472, f. 184, *p.p.* *Myriocephalum botryosporum* de Not. in Mem. Accad. Tor. ser. 2, vol. viii. (1845). Fres. Beitr. p. 40, pl. 5, f. 9.

Pustules minute, convex or conical, bursting through the epidermis and forming a black stain. Spores obovoid-globose, olivaceous-brownish, $3 \times 2{\cdot}5$–3μ, the chains loosely collected together into roundish heads which are at first enveloped in mucus; conidiophores long, colourless, 2–3μ wide.

On *Cornus alba*, Hadzor Hall, Droitwich; Heythrop Park, Oxon. On branches of *Fagus silvatica*, Wraxall; Batheaston; Bristol; Eastbourne; Wales; Ayrshire; etc. Mar.–Sept.

It has also been found in France on *Salix*, and according to Saccardo elsewhere on *Carpinus*, *Juglans*, and *Hypericum*.

Europe, N. Amer.

Hedera

Thyrsidium hedericola Dur. & Mont. Flor. Alg. i. 325. Sacc. Syll. iii. 761; Fung. Ital. pl. 1099. All. vii. 591, with fig. Mig. p. 569, pl. 79, f. 10–13. *Cheirospora botryospora* Fr. Summ. Veg. Scand. 499, *p.p.* Cooke, Handb. p. 472, f. 184, *p.p.*

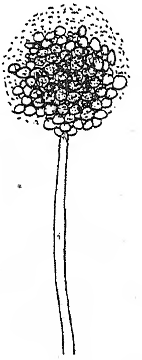

Fig. 119. *Thyrsidium hedericola*: head of spores, surrounded by mucus, × 600.

Pustules gregarious, globose-depressed, black, concealed by the epidermis, soon oozing out to form plano-convex tremelloid masses 1 mm. wide or more; stroma pallid, subgelatinous. Spores globose, olivaceous, 3μ wide, densely aggregated into roundish heads surrounded by mucus; conidiophores very long, filiform, colourless, at times branched or dichotomous, fasciculate. (Fig. 119.)

On twigs of *Hedera Helix*. England and Wales, rather common. A variety is recorded by Saccardo on *Carpinus*.

In my judgment *T. hedericola* and *T. botryosporum* are the same species; there is no difference between them when they are both of the same age.

LAMPROCONIUM Grove, in Kew Bull. 1918, p. 170 (as subgenus).

Closely resembling Melanconium in form, but the spores are blue in colour, not brownish-black, and are at length 1-septate. See Kew Bulletin, 1918, where this genus was treated as a section of Melanconium.

Differs from Discella in the total absence of a true peridium; it has only a proliferous stratum at the base.

Tilia

Lamproconium Desmazierii Grove, in Kew Bull. 1918, p. 170, f. 10. *Discella Desmazierii* B. & Br. in Ann. Nat. Hist. 1850, v. 377, pl. 12, f. 8 *a*, *b*, *c*. Cooke, Handb. p. 463, f. 175. Tul. Carp. ii. 181, 299. *Melanconium Desmazierii* Sacc. in Mich. ii. 355; Syll. iii. 751; Fung. Ital. pl. 1083. All. vii. 583, with fig. Died. p. 863, p. 823, f. 23. Mig. p. 566, pl. 78, f. 5–8. *Discula Desmazierii* Faun. and Flor. Kew, p. 172. *Epidochium Maertensii* Westd. in Prodrom. Flor. Batav. II, iv, p. 4; and Bull. Acad. Sci. Brux. xxi. 238.

Pustules rather crowded, hidden beneath the periderm, round, depressed, occasionally umbonate in the centre, black, scarcely erumpent, 0·5–1 mm. broad. Spores oblong-fusoid, straight, at first acute, then obtuse at one or both ends, colourless or faintly bluish-grey, then indigo-blue, ultimately 1-septate, sometimes guttulate, $30–36 \times 6–10\mu$; sporophores filiform, acute above, sometimes forked, somewhat mucoid, but rather persistent, hyaline, multi-microguttulate, $30–90 \times 1{\cdot}5\mu$, rising from a thick brown cellular stratum. (Fig. 120.)

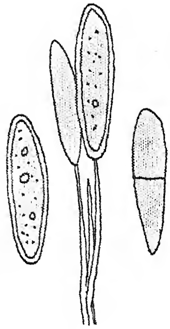

Fig. 120. *Lamproconium Desmazierii*: spores and sporophores, ×600.

On living branches of *Tilia vulgaris*, *T. platyphyllos*, Kew Gardens. On living or dead twigs of *Tilia*, Highgate; Roehampton; Suffolk; King's Lynn; Northamptonshire; Warwickshire; etc.

A peridium is indeed non-existent. The pustules resemble those of Melanconium in general character, but are not so black. When old they drop out completely, and leave a round pit or gap in the bark, extending down to the wood. The colour of the spores can attain to the brilliance of a deep sea-blue, although at other times a greyish tint prevails. The septum, though late in development, becomes finally quite distinct and bears no resemblance whatever to the false septum sometimes seen in Melanconium.

In addition, there are found on similar twigs of *Tilia* little pustules containing smaller continuous spores, probably belonging to the same life-cycle, and of two different sizes: (1) elliptic-fusoid, colourless, $12–15 \times 3–4\mu$; and (2) linear, straight, often pale-greenish, 5–6·5 $\times 2{\cdot}5–3\mu$, on long filiform sporophores (according to Tulasne, *l.c.*, who calls them microstylospores). I have met with only the first of these.

Fr. Belg. Holl. Germ. Moravia.

DIDYMOSPORIUM Nees, Syst. Pilz. p. 33 (emend. Sacc.).

"Pustules saprophytic, round or oblong, covered, soon erumpent. Spores oblong or fusoid, 1-septate, fuscous-brown or fuliginous, often shortly pedicellate."

So far as Britain is concerned, this genus is in suspense. Hardly any of the species formerly assigned to it really belong there. Greville's

record of it was a mistake, as will be seen, and the same is true of many continental records, e.g. Bresadola's *Microm. Trident.* p. 89.

Plurivorous

[**Didymosporium profusum** Fr. Syst. Myc. iii. 487. Sacc. Syll. iii. 763. All. vii. 616. Mig. 577. *Stilbospora profusa* Grev. Scot. Cr. Fl. pl. 212, f. 1.

"Pustules rather large, conical, immersed, black, bursting forth in the centre. Spores minute, oblong-ovoid, 1-septate, black, at length escaping profusely."

On inside of bark of *Acer Pseudoplatanus*. Appin (Carmichael). On the same and also on *Fagus silvatica*, Edinburgh (Greville). Also recorded on *Alnus* in Tyrol and the Ardennes, but wrongly (?).]

In Herb. Kew there are three specimens (one marked, in Cooke's handwriting, "*Didymosporium profusum* Grev. original specimen"), but the spores are only falsely uniseptate; as Bresadola says (Microm. Trident. p. 89): "spores with a thin or unreal septum and a thick oil-drop." It is really only the straight edge of the unilateral angular guttule that looks like a septum in Bresadola's specimen on *Alnus*; and the species concerned is *Melanconium apiocarpum* Link (see Grove, in Kew Bull. 1918, p. 166, figs. 5 and 5 *a*). The Scottish specimens (above) are also Melanconium.

Similarly, the fungus which Diedicke records (p. 866, p. 823, f. 29) on *Carpinus*, as *Didymosporium Carpini* Corda, is probably *Melanconium stromaticum* Corda, and the fungus recorded in Journ. Bot. 1886, p. 197 as *Didymosporium profusum* turns out to be a form of *Diplodia subtecta* Fr.

STILBOSPORA Pers. Syn. Fung. 96.

Pustules subepidermal, ± erumpent, conical or convex, black. Spores oblong or fusoid or clavate, with two or more transverse septa, fuliginous, at length protruding in a tendril-like form and afterwards effused so as to blacken the substratum for some distance around.

This genus closely resembles Coryneum, but differs in having usually looser, more powdery, spores which do not cohere to form an exposed disc, such as is typical of Coryneum. The pycnospores of each species bear a remarkable resemblance to the corresponding ascospores.

Plurivorous

Stilbospora angustata Pers. Syn. Fung. 96 (1801). Cooke, Handb. p. 468, f. 180. Sacc. Syll. iii. 772; Fung. Ital. pl. 1103. All. vii. 635, with fig. Tul. Carp. ii. 132, pl. 14, f. 15–17. Died. p. 867, p. 823, f. 30. Mig. p. 582, pl. 83, f. 4–8. *Sporodesmium angustatum* Corda, in Sturm's Deutschl. Flor. part 3, vol. ii, pl. 22. *Stilbospora macrosperma* Fresen, Beitr. p. 64, pl. 7, f. 48–52. *Prosthecium ellipsosporum* Fresen. *ibid.* p. 62, pl. 7, f. 18–23. (On *Carpinus.*)

? *Stilbospora macrosperma* Pers. Syn. Fung. 96. Cooke, Handb. 468. Sacc. Syll. iii. 772. All. vii. 637, with fig. Mig. 583. Tul. Carp. ii. 131. *Sporodesmium macrospermum* Corda, in Sturm's Deutschl. Flor. part 3, vol. ii, pl. 21. (On *Quercus* and *Alnus.*)

? *Stilbospora macrosperma* B. & Br. in Hooker's Journ. Bot. 1851, iii. 321, pl. 9, 10, and in Mag. Zool. Bot. no. 36 (1837), i. 49. (On *Ulmus* and *Cornus.*)

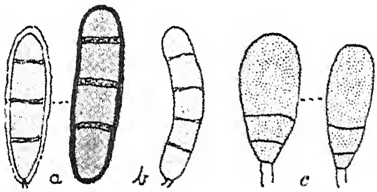

Fig. 121. *Stilbospora*: *a*, *St. angustata*; *b*, *St. thelebola*; *c*, *St. pyriformis*; spores, × 600.

Pustules for a long time immersed, convex, often confluent, black. Spores oblong-cylindrical, obtuse at both ends, usually straight, smoky-olive, 3-septate (rarely more), gently or not at all constricted, 35–50 × 10–14μ, often surrounded when young with a hyaline mucous layer, oozing out and forming large black lumps; sporophores linear-filiform, varying greatly in length, some (falsely described as "paraphyses" after they have lost their spore) "100–150 × 1–2μ" (Sacc.). (Fig. 121 *a*.)

Recorded in Britain on *Carpinus* and *Cornus*, also (chiefly under the name *macrosperma*) on *Quercus* and *Ulmus*, from many localities. Also abroad on *Alnus* and *Fagus*.

There has been great confusion in the use of these two specific names, and it seems very probably that they should be merged in one, *angustata* being the preferable name. When one attempts to tabulate the distinction alleged by various authors, one finds no agreement among them.

St. angustata is the pycnidial stage of *Pseudovalsa macrosperma* (Tul.) Sacc. Tulasne considered that *St. macrosperma* B. & Br. (on

Ulmus) belonged to a species to which he gave the name *Melanconis Berkelaei*, which is now sometimes placed as a synonym of *Pseudovalsa convergens* (Tode) Sacc. or *Ps. Berkeleyi* Sacc., *vide infra*, p. 327.
Europe, U.S.A.

Alnus

Stilbospora thelebola Sacc. Syll. iii. 771; Fung. Ital. pl. 1104. All. vii. 634, with fig. on p. 631. Died. p. 867, p. 823, f. 31. Mig. p. 582, pl. 83, f. 1–3. See Tul. Carp. ii. 166.

Pustules concealed under the elevated bark, then erumpent, blackish from the extruded spores. Spores oblong-cylindrical, straight or somewhat curved or flexuous, rounded at the ends or slightly attenuated below, 3–5-septate, not constricted, pale smoky-olive, $32–40 \times 10–11\mu$ ($20–30 \times 6{\cdot}5–10\mu$, Tul., i.e. younger); sporophores linear, hyaline, usually shorter than the spore. (Fig. 121 *b*.)

On dry branches of *Alnus glutinosa*. Shere; Lewes; etc.

Saccardo says that it is accompanied by his *Melanconis thelebola*, of which it is the pycnidial stage.

In some of the pustules I find many Cytospora-like spores, about $7 \times 1\mu$, just as Tulasne describes them, mingled with the Stilbospora; he calls these *Cytospora chrysosperma* (*alnicola*) Klotzsch.

Fr. Holl. Germ. Denm. Ital. Russ.

Castanea

Stilbospora modonia Sacc. Syll. iii. 772. Mig. 582. *Steganosporium Castaneae* Lib. in Brunaud, Contr. Flor. Myc. Ouest. 21. Sacc. Syll. x. 508. All. vii. 713. Died. 890. Mig. 599. See *Coryneum Kunzei* var. *Castaneae* Sacc., *infra*, p. 337.

Pustules immersed in the cortex, covered, at length erumpent by a fissure, olivaceo-fuscous or blackish, up to 600μ diam. Spores oblong or clavate-fusoid, rather variable, straight or curved, obtuse above, generally 6-septate, smoky-olivaceous, $50–58 \times 13–14\mu$.

On small dead branches of *Castanea vesca*. Dodderhill Common, Ws. (Rhodes). June.

The pycnidial stage of *Melanconis modonia* Tul.

Tulasne described the spores as ovate-lanceolate, pyriform, obovate or obovate-oblong, black and semi-pellucid, up to 7-septate, $20–60 \times 10–13\mu$ (and figured them under *M. modonia*, Carp. ii. 141, pl. 15, f. 4). But it is certain that it is a Coryneum and the same fungus as the var. of *Coryneum Kunzei* described *infra* on p. 337, Fig. 123 *c*. The name Steganosporium which Mme Libert conferred

upon it was misleading, as was also the name Stilbospora given by Saccardo.

The second imperfect stage which Fuckel (Symb. Myc. 190) puts forward as the "spermogone" of *Melanconis modonia* appears to me to be a slight misdescription of *Fusicoccum castaneum* Sacc. (*q.v.* Vol. I, p. 247) which belongs, not to the Melanconis, but to *Diaporthe* (*Chor.*) *castanea* Sacc., the *Cryptospora liphaemoides* of Fuckel.

Roumania.

Fagus

Stilbospora pyriformis, comb. nov. *Hendersonia pyriformis* Otth, in Mitth. Nat. Ges. Bern, 1866, p. 164. Sacc. Syll. xiv. 960. All. vii. 206. Died. p. 653, p. 640, f. 10. Mig. 354. *H. loricata* Sacc. & Roum. in Mich. ii. 629; Syll. iii. 440. See Tul. Carp. ii. 229, pl. 26, f. 3, 4. *Stilbospora Kickxii* Westd.

Pustules loosely gregarious, immersed, then erumpent, depressed-globose, 300–500μ diam., bursting the epidermis by a thick projecting papilla; wall of small-celled parenchyma. Spores pyriform or obovoid, with usually two (very rarely three) septa, the upper cell much larger than the others, not in the smallest degree constricted, truncated below, with a thick epispore, fuliginous (at first guttulate, Sacc.), 22–28 $\times$ 14–16μ; sporophores linear, hyaline, 10–14 $\times$ 2μ. (Fig. 121*c*.)

In bark of branches of *Fagus silvatica*. Stapleton and Brentry, Bristol (Bucknall). Mar. Apr.

A pycnidial stage of *Massaria loricata* Tul. See p. 342.

Fr. Belg. Germ. Ital.

Ulmus

Stilbospora Ulmi Grove. *Coryneum macrospermum* B. & Br. in Ann. Nat. Hist. 1861, vii. 381, pl. 15, f. 12. Cooke, Handb. 470. Sacc. Syll. iii. 776. All. vii. 639.

Pustules densely scattered, at length superficial, up to 330μ broad; "stroma [? subiculum] minute, pulvinate, cellular". Spores ellipsoid or subcylindrical, usually straight, 5-septate, 22–25 $\times$ 7–8μ, the end cells hyaline, the others smoky-brown; sporophores stout.

On poles of *Ulmus*. Batheaston (Broome). North Wootton (Plowright). Stevenston, Ayrshire (Boyd). Oct.–Feb.

Saccardo made a mistake in giving *Alnus* as the host; Berkeley and Broome distinctly say "on Elm", *Ulmus*.

"Forming little scattered spots on the surface of the wood. Threads cylindrical, equal, forked above" (B. & Br.). Original specimen examined. Von Höhnel agrees that it must be a Stilbospora.

Belg. Germ. Switz.

There are two other fungi on *Ulmus* (originally described under Hendersonia) which are very similar to this; they belong really to Stilbospora:

(1) **Hendersonia Ulmi** Otth, in Mitth. Nat. Ges. Bern, 1866, p. 164. Sacc. Syll. xiv. 960. All. vii. 244. *H. ulmicola* Cooke, Praecurs. Mon. Henders. p. 24 (1878). Sacc. Syll. iii. 440.

Pustules rather large, covered, obtuse. Spores oblong-ellipsoid, very obtuse at both ends, 3-septate, slightly constricted, uniformly smoke-coloured, not brown, sometimes (but rarely) curved, 48–58 × 15–20μ.

On branches of *Ulmus campestris*. Ayrshire (Boyd). Glasnevin, Dublin; etc. Oct.

It was accompanied by *Massaria foedans* Fr. of which it was considered to be probably a pycnidial stage; but cf. *Massaria Ulmi* Fckl.

This Swiss fungus is obviously not a Hendersonia in the modern sense, but is closely allied to *Stilbospora macrosperma* Pers.

(2) **Hendersonia Berkeleyi** Sacc. (in Syll. ii. 138). This Saccardo considered to be the pycnidial stage of his *Pseudovalsa Berkeleyi* (= *Melanconis Berkelaei* Tul.) and it may be identical with the fungus described by Berkeley in Mag. Zool. Bot. no. 36. The problem of their identity cannot be solved without more evidence. The Pseudovalsa appears to occur on various hosts and to show itself in differing forms, so that no two authors agree. See under *Stilbospora angustata, supra*; all the fungi just described on Ulmus seem to be the same species, though some have appendages to the ascospores and others not.

CORYNEOPSIS Grove, in Journ. Bot. 1932, p. 33.

Pustules subepidermal, soon erumpent. Spores like those of Hendersonia, but supported on long, filiform, persistent pedicels, which rise from a pale basal stratum; a peridium surrounding the spore-mass is almost or quite non-existent on leaves, but a thin kind of peridium is sometimes formed in firmer tissue, as on a stem.

This genus resembles Coryneum in some respects indeed, and was formerly merged in it, but the spores really have a very different appearance, and the two genera are not at all closely related. For, when the spores of Coryneopsis are becoming exolete, the thin walls of the loculi, between the

septa, shrink and collapse inwards. It may be mistaken for a Hendersonia, but the absence of a firm peridium distinguishes it.

Plurivorous

Coryneopsis microsticta Grove, in Journ. Bot. 1832, p. 34, pl. 599, f. 3. *Coryneum microstictum* B. & Br. in Ann. Nat. Hist. 1850, v. 458. Cooke, Handb. 470. Sacc. Syll. iii. 775; Fung. Ital. pl. 1111. All. vii. 640, with fig. Died. p. 873, p. 870, f. 4. Mig. p. 586, pl. 83, f. 9–12. *Hendersonia Rubi* Westd. *p.p.* *Sporocadus rosicola* Raben. in Bot. Zeit. 1848, p. 294, *p.p.* See Sacc. Syll. iii. 439. *Hendersonia rosicola* Sacc.

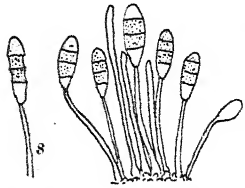

Fig. 122. *Coryneopsis Corni-albae*: group of spores and sporophores, ×600; *s*, a shrivelled spore.

Pustules scattered or aggregated, covered, black, about 500μ long, mostly longer than broad, convex, raising the epidermis, which cracks in the centre and ultimately breaks away altogether, leaving a black basal stratum. Spores subpyriform or lanceolate-oblong, obtuse at apex, somewhat acute below, 3-septate, 15–17 × 5–6·5μ, the lowest cell often subhyaline or colourless, the others honey-coloured or pale-brownish; sporophores persistent, cylindrical, straight, hyaline, 20–30 × 1·5μ.

On twigs of many species of *Rosa*, wild and cultivated, causing a disease (sometimes called "die-back"), and even on the hips of *Rosa canina*. Also on branches of *Crataegus*, *Hedera*, *Rubus*, *Tanacetum*, etc. and on leaves of *Euonymus*, *Rhododendron* (? the same species). Common: England, Wales, Scotland.

This species can at once be distinguished from Hendersonia (besides the persistent pedicels, etc.) by the fact that, when the spores get old and begin to wither, the sides sink in between the septa like a collapsing bladder; this does not take place in *Hendersonia*, *Camarosporium*, or *Coryneum*. The uppermost cell, as well as the lowest, may be paler than the middle ones. Often the spores may have only two septa.

A variety of this species is reported on *Malus* in T.B.M.S. 1924, x. 108. Forms or varieties of "*Coryneum microstictum*" are also reported abroad on *Kerria*, *Paeonia Moutan*, *Arbutus*, *Cydonia*, *Photinia*, *Laurus* (leaves), etc. Any or none of these may belong to *Coryneopsis*; no specimens of them have been seen, but it is evident that *Coryneum longe-stipitatum* Berl. & Bres. Microm. Trident. p. 80,

on branches of *Pyrus*, is a member of that genus, and the same may be said of *Hendersonia longipes* B. & C. (Sacc. Syll. iii. 423) so far as it is on *Rosa*.

Mr A. E. Ellis and I have found *Metasphaeria corticola* Sacc. repeatedly on the same twigs of wild Roses in intimate association with the Coryneopsis.

Europe, U.S.A. Algeria.

Cornus

Coryneopsis Corni-albae Grove, in Journ. Bot. 1932, p. 34, pl. 599, f. 2. *Coryneum Corni-albae* Sacc. Syll. iii. 774. All. vii. 647, with fig. Died. p. 873, p. 870, f. 3. Mig. 586. *Hendersonià vagans*, var. *Corni* Grove, in Journ. Bot. 1922, p. 81.

Pustules densely gregarious, at first covered by the epidermis which is afterwards conically raised and burst at the whitish vertex, finally pulvinate, black, up to 500μ diam. Spores oblong-fusoid, somewhat rounded above, pointed below, 15–20 × 6–8μ, at length 3-septate, not constricted, clear-yellowish, the end-cells at first paler, all afterwards becoming darker; pedicels ± persistent, colourless, filiform, about 1μ wide, as long as or longer than the spore. (Fig. 122.)

On dead branches of *Cornus alba*. Ayrshire (Boyd). Hadzor Hall, Worcs. (Rhodes). Suffolk (Mayfield). Dec.–Mar.

Distinguished from *Hendersonia Fiedleri* by the total or nearly total absence of a peridium. Occasionally the spores are only 2-septate.

Germ. Serbia.

Rosa

Coryneopsis canina Grove, in Journ. Bot. 1932, p. 34. *Hendersonia canina* Brun. in Act. Soc. Linn. Bord. 1897, lii. 146. Sacc. Syll. xiv. 955. All. vii. 232. Died. p. 659, p. 640, f. 5.

Pustules gregarious, small, round, flat, black, raising the epidermis in the centre and at length splitting it. Spores pyriform or oblong-lanceolate, very obtuse above, subacute below, with one, two, or more rarely three transverse septa, very pale-brownish, eguttulate, with the lowest cell or occasionally both the end-cells subhyaline, 13–15 × 4–5μ; sporophores filiform, up to 20 × 1·5μ.

On prickles of *Rosa canina*. River bank, Brecon. May.

This is characterised by the frequency of the 2-septate spores; the spores collapse in the same fashion as in *C. microsticta*, with which both this and the following species probably coincide.

Fr. Germ.

Coryneopsis Henriquesiana Grove, in Journ. Bot. 1932, p. 34. *Hendersonia Henriquesiana* Sacc. & Roum. in Rev. Mycol. 1884, p. 34, pl. 42, f. 7. Sacc. Syll. iii. 427. All. vii. 231, with fig. Mig. 357. Ellis, in T.B.M.S. 1914, iv. 293.

Pustules subglobose, 250μ diam., concealed by the wrinkled epidermis, which is raised and pierced by a circular or stellate opening, black; peridium none. Spores fusoid, rather acute at both ends, straight, 3-septate, honey-yellow, 14–18 $\times$ 4–6μ, scarcely constricted, the lowest loculus quite hyaline; sporophores filiform, fasciculate, 20–22 $\times$ 2μ.

On shrivelled hips of *Rosa canina*. Helmsby, N. Yorks. (F. A. Mason). Kirkby Stephen (Ellis). Saccardo's record is on putrefying hips of *Rosa villosa* from the Ardennes (Libert).

Belg. Denm. Germ. Ital.

Rubus

Coryneopsis Rubi, comb. nov. *Hendersonia Rubi* Westd. in Bull. Brux. xviii. no. 60, f. 2 (as var. of *H. sarmentorum*). Sacc. Syll. iii. 424. All. vii. 232. Died. p. 659, p. 640, f. 13. *Coryneum ruborum* Oud. in Ned. Kr. Arch. ser. 2 and 1, 295. Hedwig. xxxiii. 20.

Pustules scattered or gregarious, subepidermal, then erumpent, usually by a slit, convex or globose-depressed, blackish above, 100–250μ diam. or more. Spores ellipsoid to narrowly obovoid, 3-septate, not constricted, pale dusky-brown, 12–18 $\times$ 5–6μ, somewhat acute below, the lowest loculus nearly pellucid; sporophores persistent, colourless, filiform or subulate, sometimes broadened at the base, 12–15 $\times$ 1·5μ.

On dead shoots of *Rubus fruticosus* and of Loganberry. Common. Feb.–May.

Probably the same as *C. microsticta*, f. *Rubi*.

Forma **Rubi-idaei** Brun. in Rev. Mycol. 1886, p. 141. Died. 660.

This form, whose spores are almost indistinguishable from the type, occupies small dead whitish areas on the stems below the nodes. It is said to attack living shoots of cultivated Raspberry and Loganberry, which are thereby rendered sterile and ultimately killed. See Kew Bull. 1913, p. 198, f. 11–12. It is undoubtedly a Coryneopsis; cf. *Hendersonia platypus* Ell. & Ev. in Torr. Bot. Club, 1884, p. 73.

Other forms which have been ranged under *Hendersonia Rubi* are recorded (wrongly?) on *Euphorbia*, *Hedera*, *Lonicera*, and *Vitis*. See Sacc. Syll. x. 321, and xi. 530.

It is my belief, judging from all the specimens I have seen, that there is no Hendersonia on *Rubus*. The specimens so named are either

a young state of *Camarosporium rubicolum* Sacc. where the longitudinal septa are not yet developed, or this species of Coryneopsis. Whether this is equally true of those on *Rosa* is not so certain. See Archer, in Ann. Mycol. 1926, xxiv. 46, with fig.
Europe, U.S.A.

Spiraea

Coryneopsis Lirella, comb. nov. *Hendersonia Lirella* Cooke, in Grevill. vi. 72. Sacc. Syll. iii. 432. All. vii. 239.

Pustules scattered, linear, erumpent by a slit. Spores broadly fusoid or elliptic-clavate, 3-septate, sometimes faintly constricted at the septa, fuscous-brown, $14–18 \times 5–6\mu$, the lowest loculus paler.

On dead stems of *Spiraea Ulmaria*. Highgate (Cooke).

It has the habit of *Diaporthe Lirella* Fckl. There is no peridium and the fungus exactly resembles *C. microsticta* in character, in the lowest loculus being usually paler, and also in the loculi becoming shrunken between the septa when old. The lowest loculus is sometimes coloured, and then the spores are those of *Coryneum microstictoides* Sacc. & Penz. (Syll. iii. 774).
Tyrol.

Tamarix

Coryneopsis Tamaricis Grove, in Journ. Bot. 1932, p. 35, pl. 599, f. 4. *Hendersonia Tamaricis* Mig. p. 359, pl. 45, f. 4–8 (*non* Cooke, in Grevill. xiv. 5).

Pustules densely scattered or here and there aggregated, occasionally confluent, up to 500μ diam., at first covered by the periderm, which is elevated in a little dome and fissured. Spores oblong-oval, obtusely rounded at both ends, straight or slightly curved, 3-septate, the terminal loculi often longer than the two middle ones, hardly or not at all constricted, evenly dark-brown, eguttulate, somewhat opaque, at length $26–36 \times 12–13\mu$; sporophores long, crowded, colourless, somewhat gelatinous but persistent, nearly equal, up to 45μ long, $2–3\mu$ broad, rising from a rather dark large-celled basal stratum. Paraphyses (?) long, filiform.

On dead twigs of *Tamarix gallica*, Barmouth, Guernsey and Devon (Rhodes). On the same, Herne Bay, Kent.

Aug. Sept.

Migula's figure is excellent, but are not his "paraphyses" merely elongated sporeless pedicels?
Germ.

CORYNEUM Nees, Syst. Pilz. 34.

Pustules discoid or pulvinate, immersed, then erumpent, hard and compact, black. Spores oblong, ± clavate, or broadly fusoid, with two or more transverse septa, fuliginous, not oozing out or defiling the substratum but forming a flat exposed disc; the walls of the loculi of the spores sometimes become internally very unequally thickened, so as to leave a ± angular cavity or lumen, the so-called "guttule"; sporophores filiform or linear.

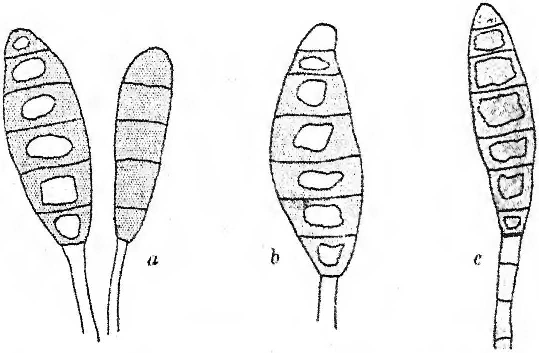

Fig. 123. *Coryneum*: *a*, *C. disciforme*; *b*, *C. umbonatum*; *c*, *C. Kunzei*, var. *Castaneae*: spores, × 600.

A former part of the genus has now been detached and is included *supra* under the name Coryneopsis. Many of the remaining species are ill-defined, and are distinguishable, if at all, only by the ascophorous stage.

Plurivorous

Coryneum disciforme K. & S. Myk. Heft. i. 76, pl. 2, f. 18. Tul. Carp. ii. 135, pl. 16, f. 1–8. Cooke, Handb. 469. Sacc. Syll. iii. 778. All. vii. 643, with fig. Oud. Mat. Myc. Néerl. ii. 27, pl. 9, f. 13. Died. 871. Mig. 585.

Pustules discoid, flat, 1–2 mm. broad, firm, black. Spores clavate, attenuated downward, obtuse above, 4–7-septate, not constricted, entirely smoke-coloured, 50–60 × 14–16μ, surrounded at first with a thin mucilaginous envelope and having an angular lumen in each loculus; sporophores continuous, short or longer than the spore. (Fig. 123*a*.)

On twigs of *Betula*; it is stated to occur also on *Quercus* and *Tilia*. Common: England, Scotland, Ireland. Dec.–Aug.

The pycnidial stage of *Pseudovalsa Betulae* Schröt. = *Ps. lanciformis* C. & de Not. The "paraphyses" said by Saccardo to be mingled with the spores are pedicels freed from spores. Tulasne (*l.c.* fig. 11) gives also "spermatia" 9–13 μ long, filiform, slender, on thin filaments up to 30 μ high.

Var. **ellipticum** B. & Br. in Ann. Nat. Hist. 1850, v. 458. Cooke, Handb. 469. Sacc. Syll. iii. 778. All. vii. 643.

Pustules large, elliptic, pulvinate, bursting transversely through the bark; subiculum thick, white, black toward the edges, consisting of closely packed elongated cells. Spores fusoid, pluriseptate, gently constricted; loculi granular, each generally containing two transversely arranged guttules.

On trunks of *Betula*. King's Cliffe (Berk.).

This variety differs chiefly in size from the typical form, which occurs on the smaller branches.

Karsten records from Finland a subspecies, *C. ambiguum*, on *Quercus*, with fusoid spores, 3–6-septate, acute, paler and oblique above, curved, at length clavate and obtuse, pallid smoky-brown, 40–63 × 17–21 μ; also another, *C. macrosporum*, on *Tilia*, with pale yellowish-fuliginous spores, 75–115 × 19–20 μ, having 6–8 transverse septa and an occasional longitudinal one.

Europe, U.S.A.

Coryneum pulvinatum K. & S. Myk. Hefte, i. 78, pl. 2, f. 19. Cooke, Handb. 469. Sacc. Syll. iii. 777. All. vii. 639, with fig. Died. 868. Mig. 584.

Pustules roundish, dish-shaped, convex, immersed, then erumpent and surrounded by the periderm, black. Spores oblong-fusoid, obtuse above, 4–5-septate, gently constricted, brown, 30–60 × 10–12 μ; sporophores cylindrical, hyaline, shorter than the spore.

On dead branches of *Tilia* and *Acer Pseudoplatanus*. Twycross; Burleigh Park; Cheshire; etc. Apr.

The length of the spore usually given (75 μ) seems to me to be too great; I have not seen them longer than 62 μ. The thick, hard, round, pulvinate, erumpent, then superficial subiculum or stroma (which is often barren) is the chief feature of this species. It has been recorded abroad also on *Ulmus*.

Europe, U.S.A. Canada.

Betula

Coryneum Notarisianum Sacc. Syll. iii. 778. All. vii. 645, with fig. Died. p. 871, p. 870, f. 2. Mig. p. 584, pl. 84, f. 8–9. *C. disciforme* Corda, Icon. iii. 36, pl. 6, f. 91 (? *non* K. & S.). *Stilbospora affinis* de Not. Sfer. Ital. pl. 53, f. 7. Cf. *C. Sydowianum* All. in Hedwig. 1896, p. (33); Krypt. Flor. vii. 639. Sacc. Syll. xiv. 1023 (on *Alnus*).

Pustules discoid, erumpent, angular or oblong, black, seated on a fleshy fuscous cellular layer (subiculum). Spores subclavate, yellowish-fuscous, then smoky-brown, 5–6- (or more) septate, 45–50μ long; sporophores simple or forked, sometimes longer than the spore.

On fallen branches of *Betula papyrifera*, Kew Gardens (Cooke). On *B. alba*, Wyre Forest; Warwickshire; Wheatfen Broad, Norfolk. Apr.

According to Corda some of the loculi are occasionally divided by a longitudinal septum; yet there can be no doubt but that this species is nothing but an advanced state of growth of *C. disciforme* K. & S., *supra*, belonging like it to *Pseudovalsa lanciformis* C. & de Not.

Camellia

Coryneum Camelliae Massee, in Grevill. xx. 8. Sacc. Syll. x. 482. All. vii. 645.

"Pustules gregarious, epiphyllous, on large irregular bleached spots which are limited by a dark margin, splitting the epidermis in a linear, triangular, or irregular manner. Spores lanceolate, $30 \times 10\mu$, with two to four coloured median cells and hyaline triangular apical and basal cells; sporophores of about equal length."

On living leaves of *Camellia*, Kew Gardens (Massee).

There can be no possible doubt but that Massee's supposed species is merely *Pestalotia Guepini* Desm. in an old and battered state after its setae have fallen off. *Vide infra*, p. 347.

Castanea

Coryneum pustulatum Peck, in 33rd Rep. N.Y. State Mus. p. 26, p. 1, f. 1–3. Sacc. Syll. iii. 777. Cf. *Cor. Kunzei*, var. *Castaneae*.

Pustules convex, immersed in the bark, covered by the elevated epidermis which is at length fissured. Spores subclavate or slightly fusoid, curved, uniformly smoky-brown, guttulate, 6–7-septate, $40–50 \times 9–12\mu$; sporophores short.

On dead branches of *Castanea vesca*. Kew Gardens (Cooke). Dodderhill Common, Worcestershire.

Closely allied to *C. compactum*, *q.v.*; spores the same in colour and appearance, but longer and with more septa, though some of the spores were exactly alike in the two species. The size of the American spores is given as 62–75 × 12–14 μ. The statement in the Kew Bulletin, 1907, p. 241, that the Kew Gardens specimens are on "Horse Chestnut" (*Aesculus*) is incorrect. See *Coryneum Kunzei*, var. *Castaneae*.

U.S.A. Canada (on *Quercus* also).

Cistus

Coryneum cistinum Cooke, in Grevill. xiv. 5. Sacc. Syll. x. 481. All. vii. 646.

Pustules orbicular, pulvinate, convex, black, seated in the inner bark, gregarious, covered and wholly concealed by the outer bark, and only exposed when that falls away. Spores oblong-lanceolate, obtuse at the ends, 3-septate, not at all constricted, dark uniform brown, opaque, 40–50 × 12–16 μ; pedicels hyaline, about as long as the spore, at length deciduous.

On partly decorticated branches of *Cistus laurifolius*. Kew Gardens (Cooke).

The non-compact pustules are arranged in linear or lanceolate groups or clusters, lying parallel to the length of the branches. I make the spores rather smaller than as stated by Cooke ("50–55 × 15–18 μ") and also much darker. It is not a true Coryneum, but a form of *Stilbospora angustata*; see Fig. 121*a*, p. 324, *supra*.

Potentilla

Coryneum Comari Trail, in Scot. Nat. 1887, p. 90. Grevill. xv. 110. Sacc. Syll. x. 484. All. vii. 647.

"Pustules grouped on ill-defined darker spots, circular, 50–60 μ diam., with a conspicuous pore. Spores broadly fusoid, straight, honey-yellow, darkening to a pale-brown colour when older, 3-septate, 25–30 × 4–5 μ."

On leaves of *Potentilla Comarum*, near Aberdeen (Trail). *n.v.* Aug.

This seems more likely to be a Coryneopsis.

Prunus

Coryneum Laurocerasi Prill. & Del. in Bull. Soc. Myc. Fr. 1890, vi. 180. Sacc. Syll. x. 481. All. vii. 655. Died. 874.

Spots visible on both sides of the leaf, circular, up to 1 cm. diam., deep-brown with a definite border, at length paler in the centre, dropping out and leaving a "shot-hole". Pustules

subepidermal, small, erumpent. Spores oblong, fusoid, or clavate, 3–7-septate, slightly constricted, pale-brown, 45–80 (or even 90) × 14–18μ; sporophores simple, flexuous, up to 180μ long, 5–7μ wide, rising from a pale-brown parenchymatous basal stratum.

On living leaves of *Prunus Laurocerasus*. Potterne, Devizes, causing a serious loss of foliage. Nov. Dec.

Tending towards Coryneopsis; the spores are very pale in colour. Cf. *C. Beyerinckii*, which usually has shorter spores, and *C. umbonatum* var. *Prunorum*.

Fr. Germ.

Coryneum Beyerinckii Oud. in Hedwig. 1883, p. 115. Sacc. Syll. iii. 774. All. vii. 640. Massee, Dis. Cult. Pl. p. 454, f. 139. Duggar, Fung. Dis. Pl. p. 336, f. 160. Stevens, p. 560, f. 378.

"Pustules gregarious, very minute, punctiform, black. Spores arising from a brownish parenchymatous cushion, pedicellate, oblong-ovoid, about 36 × 15μ, generally 3-septate, very slightly constricted, pale-olivaceous, all the loculi equal or the end ones slightly smaller and sometimes devoid of colour; sporophores cylindrical or slightly thickened downwards, colourless, about as long as the spore."

On trunks and branches of *Amygdalus* (*Prunus communis*), causing gummosis. Ireland. *n.v.*

This species has been said to have an ascophorous stage, *Ascospora Beyerinckii* Vuill. = *Asterula Beyerinckii* Sacc.

Holland (on *Almond*).

Quercus (and **Castanea**)

Coryneum Kunzei Corda, Ic. Fung. iv. 46, pl. 10, f. 131. Cooke, Handb. 470. Sacc. Syll. iii. 778; Fung. Ital. pl. 1110. All. vii. 642, with fig. Died. 872. Mig. p. 585, pl. 84, f. 1–5. *C. disciforme* Nees, *p.p.*

Pustules discoid, erumpent, black. Spores clavate, rarely fusoid, always somewhat curved, 5–7-septate, not constricted, olivaceous-fuscous, 60–70 × 12–14μ, with the upper obtuse loculus often paler and oblique; each of the other loculi furnished with a large cuboid cavity or so-called "guttule"; sporophores ± persistent, filiform, nearly or quite hyaline, occasionally septate, reaching up to 120 × 3–4·5μ.

On dead twigs of *Quercus*. Blackheath; Shere; Chislehurst; Rudloe; Ross; Penzance; Shropshire; Scarborough; etc.

Feb. Mar.

Considered to be the pycnidial stage of *Pseudovalsa longipes* Sacc. on *Quercus*. But it is also recorded (? wrongly) in other countries on *Alnus*, *Betula*, and *Fagus*. The uppermost colourless loculus seems rather to be the result of incipient germination.

Europe, U.S.A. Canada.

Var. **Castaneae** Sacc. & Roum. in Rev. Mycol. 1884, p. 36. Sacc. Syll. iii. 778. All. vii. 642. Mig. 585. Sm. & Ramsb. in T.B.M.S. 1913, iv. 180. *Steganosporium Castaneae* Lib.

Spores fusoid, attenuated below, 4–6-septate, smoky-olivaceous, obtuse above, $50–52 \times 10–12\mu$, the upper loculus often almost colourless, the others each with a large squarish "guttule" or lumen; sporophores stout, flexuous, mostly longer than the spore. (Fig. 123 *c*, p. 332.)

On dead branches of *Castanea vesca*. Stevenston and West Kilbride, Ayrshire (Boyd). Cheshire (Ellis). Isleworth (Cooke). Dodderhill Common, Ws. (Rhodes). Oscott.

Apr.–Jun.

The pycnidial stage of *Melanconis modonia* Tul. The spores of the Ayrshire specimen differ from the original description in having up to 7 septa and measuring $50–64 \times 10–15\mu$. The Cheshire specimens have clavate or fusoid spores, often curved, $40–65 \times 12–20\mu$, 5–6-septate; they are very similar to Saccardo's figure in Fungi Italici (pl. 1110). But see *Stilbospora modonia*, *supra*, p. 325.

Ardennes, Holland, Germany.

Coryneum umbonatum Nees, Syst. Pilz. p. 34, f. 31. Corda, Ic. iii. 36, pl. 6, f. 92. Tul. Carp. ii. 138, pl. 15, f. 9, 10. Cooke, Handb. p. 470, f. 182. Sacc. Syll. iii. 777; Fung. Ital. pl. 1109. All. vii. 645, with fig. Died. 872. Mig. p. 585, pl. 84, f. 10–13. *Steganosporium elevatum* Riess, in Bot. Zeit. 1853, pl. 3, f. 24–27.

Pustules discoid, black, 1–2 mm. across, umbonate, covered, then erumpent, opening widely; subiculum brown, minutely cellular. Spores broadly fusoid, 5–8-septate, smoky-brown, $42–50 \times 16–18\mu$, each loculus thick-walled with a round or angular lumen, except sometimes the apical cell which may be nearly colourless; sporophores linear, hyaline, sometimes forked at the base, about as long as the spore. (Fig. 123 *b*.)

On fallen branches of *Quercus*: Shere; Kew Gardens; King's Lynn; etc. On *Q. Cerris*, Ayrshire (Boyd). On *Q. Ilex*: Cornwall (Rilstone); Hadzor Hall, Ws.; Evesham. Spring.

The pycnidial stage of *Pseudovalsa umbonata* Sacc. It is recorded abroad on *Carpinus* and *Ulmus* also, and there is a var. *Prunorum* Sacc. (*l.c.*) found in the Ardennes, with spores $40–45 \times 16\mu$, 7–9 septa, and a subhyaline apex.

Europe, U.S.A.

Coryneum depressum K. & S. Myk. Heft. i. 75, pl. 2, f. 17. Sacc. Syll. iii. 779. All. vii. 655, with fig. Died. 874.

Pustules depressed, very flat, black, 1–2 mm. diam., surrounded by a collar of the epidermis. Spores obovoid-oblong, mostly rounded above, fuscous, 4–5-septate, $45–50 \times 16–20\mu$, walls thickened within, lumen very angular; sporophores filiform, nearly colourless, short or longer than the spore.

On fallen branches of *Quercus Robur*. Berkswell Park, Wk. Aug.

This might be only a younger form of *C. umbonatum*. The colour seems to reside chiefly in the outer membrane of the spore, the inner thickening being hyaline, as may be seen on crushing the spore; it has no tint of olive, only a clear pale sepia-brown.

Germ.

Salix

Coryneum salicinum Sacc. Syll. iii. 777. All. vii. 658. Mig. 588. *Didymosporium salicinum* Corda, Icon. i. 7, f. 108.

Pustules black, covered, then erumpent and bursting the epidermis in a stellate manner. Spores fuscous, 3–4-septate, not constricted, $13–16 \times 6–7\mu$, rising from a horny black basal stratum.

On dead twigs of *Salix*. Halesowen. Mar.

Coryneum Kunzei var. *Salicis* (*nom. nodum*) on twigs of *Salix Smithiana*, Kew Gardens (Cooke, *ined.*), is perhaps a mistake; there is now no Coryneum visible on the specimen in Herb. Kew.

Bohemia.

Ulmus

Coryneum compactum B. & Br. in Ann. Nat. Hist. 1850, v. 458. Cooke, Handb. 470. Sacc. Syll. iii. 776. All. vii. 641, 660.

Pustules scattered, minute, at first covered by the epidermis, then naked; subiculum convex. Spores broadly fusoid, only slightly obtuse, uniformly smoky-brown, 4–5-

septate, 35–40 × 10μ, each cell with a thick wall and a large "guttule", i.e. lumen; sporophores persistent, rather stout.

On dead twigs of *Ulmus*, Wraxall; Scarborough; Bristol. On dead wood of *Ulmus*, Stevenston, Ayrshire (Boyd).

Oct.–Mar.

Occasionally a faint line is seen, connecting the "guttules" with one another longitudinally.[1] The specimens on *Betula*, from U.S.A., seem exactly similar. Cf. *Steganosporium compactum* Sacc. Fung. Ital. pl. 1107, also on *Ulmus*.

S. Carolina (on *Betula*).

TOXOSPORIUM Vuill. in Bull. Soc. Myc. Fr. 1896, p. 34.

Pustules somewhat lenticular, erumpent, scattered, minute, black. Spores curved, tapering and beaked at each end, 3–5-septate, the two inner cells coloured, the basal and apical ones hyaline; sporophores short, simple.

Abies

Toxosporium camptospermum Maubl. in Bull. Soc. Myc. Fr. 1907, xxiii. 173. Lind, Dan. Fung. 491. Wilson, in T.B.M.S. 1928, xiii, p. 154, pl. 8, f. 3. *Pestalozzia camptosperma* Peck, in 39th Report, 1886, p. 48, pl. 1, f. 10, 11. Sacc. Syll. x. 495. *Monochaetia camptosperma* Sacc. Syll. xviii. 485. *Toxosporium abietinum* Vuill. in Bull. Soc. Myc. Fr. 1896, xii. 33. Sacc. Syll. xiv. 1030. All. vii. 708. *Coryneum bicorne* Rostr. Mykol. Meddel. viii. 271. All. vii. 638.

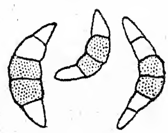

Fig. 124. *Toxosporium camptospermum*, spores, ×600.

Pustules stromatic, pulvinate, erumpent, surrounded by the ruptured epidermis, turning black, 100–250μ wide. Spores curved and fusoid, 3–5-septate, swollen in the middle part, 18–24μ long, 7·5–8μ wide at the middle; sporophores 5–6 × 1·5–2μ. (Fig. 124.)

On dead leaves of *Abies pectinata*. Argyllshire (Wilson), 1925. *n.v.*

Wilson remarks that the pycnidia emerge through the pore of a stoma, like the *Rhizosphaera Kalkhoffii* with which it was found in

[1] For an explanation of this "line", which is seen in other species of the genus, and of its meaning and cause, see Buller's "Researches on Fungi", 1933, vol. v, p. 94, f. 50, no. 34, A.

company. Lind says that it was in company with *Mycosphaerella Abietis* Lindau, on dead leaves of *Abies alba*.

Fr. Holl. Denm. U.S.A.

SCOLECOSPORIUM Lib. *apud* Sacc. in Mich. ii. 355.

Pustules subepidermal, pulvinate, small, compact, black. Spores fusoid, fuliginous, with several transverse septa, more or less beaked at the summit; sporophores short.

Fagus

Scolecosporium Fagi Lib. *apud* Sacc. in Mich. ii. 355. Sacc. Syll. iii. 782; Fung. Ital. pl. 1091. All. vii. 662, with fig. Died. p. 875, p. 870, f. 5. Mig. p. 589, pl. 85, f. 5–8. *Coryneum macrosporium* Berk. Engl. Flor. v. 355. Tul. Carp. ii. 221, pl. 26, f. 10, 11. Cooke, Handb. 469. *Sporodesmium vermiforme* Riess, *apud* Fresen. Beitr. ii. 51, pl. 6, f. 56–8.

Pustules pulvinate, depressed, immersed, then erumpent and surrounded by the periderm, black, whitish within, varying in form and size. Spores fusoid, 7–12-septate and guttulate, smoky-brown, $100–190 \times 12–15\mu$, subhyaline and beak-like above, beak curved to one side; sporophores short and stout. (Fig. 125 *a*.)

On twigs and branches of *Fagus silvatica*. Northamptonshire; Weybridge; North Wootton; Batheaston; Twycross; etc. Dec.–Mar.

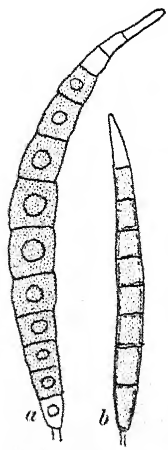

Fig. 125. *Scolecosporium*: *a*, *S. Fagi*; *b*, *S. Typhae*, var. *major*; spores, × 600.

The lowest loculus of the spore is often, but not always, paler. It is the pycnidial stage of *Massaria macrospora* Sacc. = *Cucurbitaria macrospora* Ces. & de Not. in company with which it is often found.

Fr. Belg. Holl. Germ. Denm. Ital.

Typha

Scolecosporium Typhae v. Höhn. Fragm. Mykol. no. 268. Died. p. 875, p. 870, f. 6. *Hendersonia Typhae* Oud. Mat. Flor. Myc. Néerl. ii. 19. Sacc. Syll. iii. 435. All. vii. 243. Grove, in Journ. Bot. 1918, p. 317, pl. 550, f. 6 (incorrect). *Scolecosporiella Typhae* Petr. in Ann. Mycol. 1921, xix. 31.

Pustules scattered or gregarious (on extensive brown or grey spots on the leaves), subglobose, open above, up to

150μ diam. Spores fusoid, somewhat obtuse below, tapering upwards into a paler elongated point or beak, clear brownish-olive, 5-septate, 50–60 × 7–8μ, with several small guttules or one or two larger ones in each loculus; no sporophores seen; basal stratum soft, thin, pellucid-fuscous. (Fig. 125 *b*.)

On peduncles of *Typha angustifolia*. Surlingham Broad, Norfolk (Rhodes). Wheatfen Broad (E. A. Ellis).

Mar.–Jun.

Var. **major** Grove, in Journ. Bot. 1918, p. 317, pl. 550, f. 6 (as Hendersonia). Spores 5–9-septate, eguttulate, 60–80 × 7μ.

On dead leaves of *Typha latifolia*, Dumbartonshire (Boyd).

Oct.

The spores stand erect in a single layer, parallel to one another. Germ. Holl. U.S.A.

ASTEROSPORIUM Kunze, in Flor. Ratisb. 1819, p. 225.

Pustules pulvinate, erumpent, black. Spores stellate, not concatenate, dark-brown; the arms of the star taper to the apex and are transversely pluriseptate; sporophores straight, rather long.

Plurivorous

Asterosporium Hoffmanni Kunze, in Flor. Ratisb. 1819, i. 225. Cooke, Handb. p. 468, f. 181. Sacc. Syll. iii. 782. All. vii. 663, with fig. Died. p. 876, p. 870, f. 7. Mig. p. 589, pl. 85, f. 9–12.

Pustules slightly prominent, obtuse, covered at first by the elevated epidermis, 1–3 mm. wide, at length torn or cleft above; basal tissue floccose, yellowish-brown. Spores stellate, with four non-coplanar radii; radii bluntly conical, triseptate, obscurely guttulate, smoky-brown, 20–25 × 12–16μ; sporophores linear, continuous, hyaline, 20–45 × 2μ. (Fig. 126.)

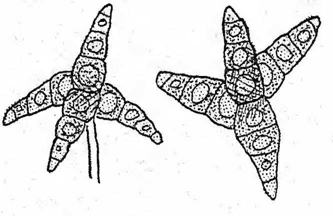

Fig. 126. *Asterosporium Hoffmanni*: two spores, × 600.

On branches of *Fagus* and *Betula*. Not uncommon: Suffolk;

Rising; King's Lynn; Burnham Beeches; Dodderhill Common; Evesham; Cornwall; Ayrshire; Roxburgh; Inverness.

Autumn and winter.

Tulasne suggested, but with doubt, that it is a pycnidial stage of either his *Massaria loricata* or his *M. eburnea* (Carp. ii. 242); he also considered that the pustule of spores is enclosed in a thin evanescent peridium of which I have seen no trace. Von Höhnel suggested Botryosphaeria as the perfect stage, but withdrew the suggestion later. Crouan suggested Cucurbitaria. I myself have found the Asterosporium growing in the same pustule, side by side in close actual physical connexion on the same proliferous stratum, with *Scolecosporium Fagi*, which is acknowledged to be a pycnidial stage of *Massaria macrospora* Sacc. (see p. 340); therefore it would seem that that ascomycete, which = *Cucurbitaria macrospora* Ces. & de Not., is also the perfect stage of the Asterosporium. Currey, in Quart. Journ. Micro. Sci. 1856, iv. 192–7, pl. 11, f. 1, arrived at the same conclusion on the same ground. It is curious that Tulasne (Carp. ii, pl. 26) figures *M. loricata* and *M. macrospora* (under Cucurbitaria) both on the same plate. I suggest that *M. loricata* is merely an early state of *M. macrospora*. See also *Stilbospora pyriformis* (Otth), which is another pycnidial stage of the same ascomycete, *supra*, p. 326.

The drawings given in books misrepresent the mode of growth of the spore. It takes place as follows: a globose cell arises at the apex of the linear pedicel; this swells up into an obpyriform shape, and the upper and smaller part is cut off by a horizontal wall. Then the lower larger cell cuts off three similar portions (at angles of 120° apart), the four planes thus produced forming the sides of a tetrahedron poised on one of its points at the apex of the pedicel. Each of the four cells cut off then elongates at the part most distant from the tetrahedral cell, becomes bluntly conical and 3-septate; the four radii point, one upwards and three divergently downwards. The resulting spore has the shape of the obsolete weapon of war called a caltrop or (as Montagne remarked a hundred years ago, in Ann. Sci. Nat. 1836, vi. 339) a "*chausse-trappe*".

SEPTOTRULLULA v. Höhn. Fragm. Myk. no. 36, 1903, p. 39.

Pustules emergent, pulvinate, blackish. Spores concatenate, ± elliptic-fusoid or even oval, but truncate at the ends when in contact, transversely septate, at length pale-olivaceous; sporophores crowded, cylindrical, colourless.

Cf. *Seiridiella ramealis* Karst. Symb. Myc. Fenn. xxx. 67 (Sacc. Syll. xi. 581), on *Fagus* and *Betula*; and also *Taenio-*

phora acerina Karst. *ibid.* xvii. 163, on *Acer* (Sacc. Syll. x. 443).

Alnus

Septotrullula bacilligera v. Höhn. Fragm. Myk. 1903, no. 36, p. 40. Mig. 591. *S. peridermalis* v. Höhn. *ibid.* p. 41.

Var. **cambrica** Grove & Rhodes, in Journ. Bot. 1932, p. 33.

Pustules minute, scattered, pulvinate, black, 200–250μ diam. Spores fusoid, oval or even ovoid, connected in chains and then truncate at the junctions, basipetally formed, the lowest one fusoid and colourless, the next one above 1-septate and faintly coloured, the older ones pale-fuliginous, oval and generally 3-septate, hardly constricted, afterwards, especially when they are freed, they become ± obovoid and 4–5-septate, 20–32 × 5–8μ; sporophores cylindrical, simple, colourless, up to 20 × 2μ. (Fig. 127.)

On the upper portions of dead twigs of *Alnus*. Cwm Llwch, Brecknock (Rhodes & Grove). May.

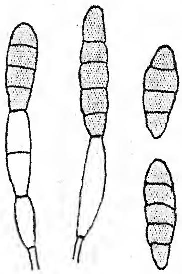

Fig. 127. *Septotrullula bacilligera,* var. *cambrica,* ×600.

Von Höhnel's *Septotrullula bacilligera* and *S. peridermalis* are mere stages leading up to the full development seen in var. *cambrica.* Seiridiella and Taeniophora are in many respects similar genera, perhaps identical.

Austria.

MONOCHAETIA Sacc. Syll. iii. 797 (as subgenus of Pestalotia), 1884.

Pustules subepidermal, at length ± erumpent, discoid or pulvinate, small, black. Spores oblong-fusoid, with two or more transverse septa, at least partly tinged with a dark colour, and provided at the apex with a hyaline seta. Sporophores persistent.

It is, as it were, a Pestalotia with only one seta. It is often assumed now that Saccardo's subgenus is the same as the Hyaloceras of Durieu and Montagne (Flor. Alg. p. 587). But this identification seems to be by no means certain. I believe that the two genera are distinct.

Cryptomeria

Monochaetia Cryptomeriae Wilson, in T.B.M.S. 1924, ix. 192, pl. 8, f. 1–7.

Pustules amphigenous, scattered, immersed, then erumpent, circular or ovoid, blackish, opaque, not shining, 0·75–1 mm. diam. Spores fusoid, rather acute at both ends, 4-septate, very slightly constricted, 22–30 × 7·5–10μ; end cells hyaline, middle cells chocolate-brown, the central cell darker than the two others; apical seta 20–32 × 1μ, filiform, oblique at base but straight in the upper part; sporophores hyaline, 4–20 × 1–2μ. (Fig. 128.)

On dead fallen leaves of *Cryptomeria japonica*. Raith, Fifeshire (Wilson).

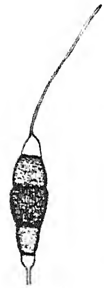

Fig. 128. *Monochaetia Cryptomeriae*: spore, × 600.

Very different from *Pestalozzia Cryptomeriae* Cooke (Grevill. xii. 24), on the same host from South Carolina, which has three apical setae and the coloured cells uniformly brown.

Rosa

Monochaetia compta All. vii. 672, with fig. Mig. p. 592, pl. 89, f. 8–10. *Pestalozzia* (*Monochaetia*) *compta* Sacc. Syll. iii. 798; Fung. Ital. pl. 1116. *Hyaloceras comptum* Died. p. 879, p. 870, f. 8.

Var. **ramulicola** Berl. & Bres. Microm. Trident. 81. Sacc. Syll. x. 493. All. vii. 673. Grove, in Journ. Bot. 1932, p. 5.

Pustules gregarious, angular or roundish, subprominent, black, about 300μ wide, covered, then bursting the epidermis irregularly. Spores elliptic-fusoid, 11–14 × 3·5–4μ, 3-septate, the two end cells both hyaline, the two middle ones brownish, furnished at the acute apex with a long (up to 20μ) curvulous or rarely hooked hyaline seta; sporophores about as long as or longer than the spore, rather straight, filiform, colourless, 1·5–2μ wide.

On a dead stem of a cultivated Rose (*Rosa rugosa*, prob.). Salcombe, Devon. Apr.

This species (without its seta) is very similar in some respects to *Coryneopsis microsticta* (B. & Br.). Saccardo's type was on the leaves of *Rosa*.

Germ. Ital.

PESTALOTIA de Not. in Mem. Acad. Sci. Tor. 1839, iii. 80; Desm. in Ann. Sci. Nat. 1840, xii. 182.

Pustules immersed, at length erumpent (but, in the not-yet-found in Britain *P. pezizoides* de Not., more superficial), discoid or pulvinate, black, usually small. Spores oblong-fusoid, with three or more transverse septa, the middle loculi dark or olivaceous, the terminal ones colourless and conical, provided at the apex with two or more pellucid setae; sporophores filiform, hyaline, ± persistent.

Growing on branches, leaves, cones, and woody fibres.

The spelling originally used by Desmazières in 1840 in naming *P. Guepini*, viz. *Pestalotia*, was changed into *Pestalozzia* by Corda (Ic. Fungorum) in 1842. Pestalotius was rightly considered to be the Latinised form of Pestalozza, the Italian botanist after whom the genus was named. In passing, by-the-by, it may be remarked that this principle in naming was customary in those primitive times; thus, when an algal genus was to be dedicated in honour of the French botanist, Draparnaud, his name was first correctly Latinised into Draparnaldus, and so the name became *Draparnaldia*. But, though we still affect to consider the generic titles as Latin words, most of us have not now the courage for consistency. Hence an attempt has since been made to change Draparnaldia into Draparnaudia. The reverse change from Pestalozzia to Pestalotia, suggested by Guba in his monograph of the genus (Part I) in Phytopathology, 1929, xix. 191–232, followed by Part II in Mycologia, 1932, xxiv. 355–397, is adopted here.[1]

Certain authors assert that the ends of the setae of the spores are occasionally knobbed, but this I believe is always an optical illusion caused by the curling up toward the lens of the extreme tips which thus become slightly out of focus.

Plurivorous

Pestalotia truncata Lév. in Ann. Sci. Nat. 1846, v. 285 (as Pestalozzia). Sacc. Syll. iii. 794. All. vii. 676. Died. 883. Mig. 594.

Pustules gregarious, globose-depressed, at length erumpent, black within. Spores ovoid or oblong, often inequilateral, 20–21μ long, 3-septate; the two middle cells larger, almost cubical, smoky-brown, guttulate; the end-cells minute, hyaline; apical bristles 2–4, ± curved or reflexed; sporophores

[1] Anyone who prefers the double "z" is at liberty to write Pestalozzia, and "nobody" will be "one penny the worse".

filiform, often longer than the spore. The upper and lower cells at length easily fall off and leave what appears to be a brown truncate 1-septate spore, measuring about 16–17 × 8–9 μ. (Fig. 129 *a*.)

On dead bark of *Crataegus*, and on chips of *Quercus*, *Cornus* and *Salix*. Kew; Norfolk; Wiltshire; Forden; Melrose; Abberley and Monk Wood, Ws.; etc. Oct.–Nov.

Recorded abroad on cone-scales of *Abies*, and on wood of *Fagus*, *Eucalyptus*, *Padus*, *Pobulus*, *Sorbus*, as well as on stems of *Hypericum*, but for the last-mentioned cf. Diploceras, *infra*, p. 352.

Fr. Holl. Germ. Denm. Bohem. Ital. U.S.A.

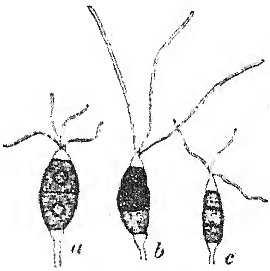

Fig. 129. *Pestalotia*: *a*, *P. truncata*; *b*, *P. macrotricha*; *c*, *P. fibricola*; spores, all × 600.

Var. **lignicola**. *Pestalozzia lignicola* Cooke, Handb. 471. Sacc. Syll. iii. 794. All. vii. 679.

Pustules semi-immersed, laterally compressed by the pressure of the wood-fibres, black. Spores oblong or fusoid, 3-septate; the cells at each end hyaline, intermediate cells brown; bristles 2–4, hyaline, simple; sporophores very long. (Saccardo adds, from Venetian specimens: spores 12–18 × 4–7 μ; setae 20–25 × 1 μ; sporophores 20–30 × 1 μ.)

On chips and wood. Shere; Highgate; Saltaire; Shipley Glen, Yorks.; Monk Wood, Worcs.

Recorded abroad on *Pinus*, *Acacia*, *Salix*, *Rosa*. Cooke remarks that this has the appearance of one of the Lophiostomaceae; my specimens, on chips of Oak from Monk Wood, looked like black perithecia semi-emergent from between the fibres of the wood and were sometimes compressed. The end-cells of the spores readily fell off, as in *P. truncata*, except when they were honey-coloured as they sometimes were. Hardly worth distinguishing.

Fr. Holl. Ital. U.S.A. Argentina.

Bast-fibres

Pestalotia fibricola Grove, in Journ. Bot. 1886, p. 198, pl. 266, f. 7 (as Pestalozzia). Sacc. Syll. x. 487. All. vii. 705.

Pustules small, gregarious, elevating the fibres which are at length pierced by a pore. Spores erumpent, elliptic-fusoid, 4-septate, 17–18 × 5 μ; the three interior loculi olivaceous,

often guttulate, the middle one darker; the upper hyaline, conoid, 4–5μ long, bearing 1–3 hyaline, spreading or recurved, bristles 12–18μ long; the lower hyaline, short, triangular; sporophores very short, $3 \times 0{\cdot}5\mu$. (Fig. 129 *c*.)

On fibres used by gardeners under the name of "bast" (? of *Tilia*). Sutton Coldfield, Wk. Sept.

No doubt imported from Germany with the plants which the bast was used for tying. Distinguished from *P. macrotricha* in the middle loculus being darker, but not opaque, and by the shorter setae. The bristles are slightly connate at the base; two are most commonly found; when there is one, it is longer and obliquely curved. The upper loculus falls off with the bristles.

Camellia

Pestalotia Guepini Desm. in Ann. Sci. Nat. 1840, xiii. 182, pl. 4, f. 1–3. Guba, *l.c.* I, p. 198, f. 1 *a*, and pl. 4, C, D. *Pestalozzia Guepini* Lév. in Ann. Sci. Nat. 1846, v. 285. Cooke, Handb. p. 471, f. 183. Sacc. Syll. iii. 794. All. vii. 680. Died. 882. Mig. 594. Lind, Dan. Fung. p. 490, f. 36. *P. Karstenii* Sacc. & Syd. Syll. xiv. 1030. *Coryneum Camelliae* Massee, in Grevill. xx. 8, and in Kew Bull. 1898, p. 106.

Spots roundish, brown, becoming grey or bleached, with a narrow red-brown border. Pustules amphigenous, scattered, minute, punctiform, convex, black, 100–150μ diam., covered, then erumpent through the fissured epidermis. Spores fusoid, 4-septate, $14–20 \times 6\mu$; the central cells pale-brown, semi-opaque, the end-cells conical, hyaline; the apex crowned by 2–4 slender, hyaline, divergent bristles a little longer than the spore; sporophores hyaline, as long as the spore or shorter; spores issuing as little tendrils.

A true parasite on living leaves of *Camellia japonica* in conservatories. England, Scotland. Nearly all the year round, especially in Oct. Nov.

The record on Rhododendron (T.B.M.S. ix. 132) may belong to *P. macrotricha* Kleb, or *P. Rhododendri* Guba.

The typical form, which was once rather common in this country, occurred on Camellia leaves, on which it produced those roundish brown or grey blotches, covered with minute black specks, that were often attributed by gardeners to "sun-burn". In India and Ceylon it has been said to cause a very destructive disease of the Tea-plant, and to attack also Coco-nut, Rose, and Hevea; in U.S.A., Africa, Queensland, New Zealand, etc., it has been thought to infest

Citrus, Magnolia, Amygdalus, Smilax, and other plants; and a variety (now called *P. Vaccinii* Guba) was recorded on *Vaccinium macrocarpon* by Shear in U.S.A. in 1902. But probably all (or most) of these forms are really distinct species; see Butler, "Fungi and Disease in Plants", pp. 413, 451, and Guba, *l.c.* p. 200.

All tropical and warm-temperate regions (*sens. lat.*).

Coniferae

Pestalotia funerea Desm. in Ann. Sci. Nat. 1843, xix. 335. Guba, *l.c.* I, p. 202, f. 3. *Pestalozzia funerea* Cooke, Handb. 471. Sacc. Syll. iii. 791; Fung. Ital. pl. 1115. All. vii. 681, with fig. Died. p. 884, p. 870, f. 12. Mig. p. 597, pl. 87, f. 4–6. Stevens, p. 559, f. 376.

Pustules scattered, punctiform, very black, covered by the epidermis, then emergent, with a flat whitish proliferous basal stratum. Spores oblong-fusoid, 4-septate, slightly constricted at the septa, $22–32 \times 6–8\mu$; the three inner loculi uniformly fuscous or dark-olivaceous, the end ones small, conical, hyaline; the apex crowned with 2–5 hyaline, short, filiform, straight and spreading or more often recurved bristles, $10–15 \times 0{\cdot}7–1\mu$, issuing in damp places in straight stiff erect columns (not tendrils); sporophores $5–9 \times 1–1{\cdot}5\mu$.

On living or dead leaves and branches of Conifers (*Biota, Cryptomeria, Cupressus, Sequoia, Taxus, Thuja*, etc.). Hounslow; Kew; Stratford-on-Avon; Hadzor, Worcs.; Heythrop Park, Oxon.; Isle of Wight; Ireland; etc.

This species can be a true parasite and cause a disease. Desmazières met with a form (his var. *heterospora*) on *Cupressus*, which had a few of the spores 5-septate, with long pedicels as long as the spores and no apical appendages. The foreign records on non-coniferous hosts should all be discredited, and transferred elsewhere.

Forma **conigena** (Lév.).

Pestalozzia conigena Lév. in Ann. Sci. Nat. 1846, v. 285. Sacc. Syll. iii. 792. All. vii. 697. Died. 884. Mig. 596. Grove, in Journ. Bot. 1912, p. 54, pl. 516, f. 12. Guba, Mon. II, fig. 3 (as Pestalotia).

On cones of *Thuja occidentalis*, Studley Castle, Wk. On the same cones was *Pleospora Thujae* Grove, *l.c.* p. 49. On cone of *Pinus insignis*, Cornwall.

This form is recorded abroad also on cones of *Abies*. Sometimes the middle loculus is darker than those above and below it, as in *P. funerea* var. *discolor*; otherwise it resembles the type in having the three loculi uniform, though often rather darker in colour.

Europe, Siberia, India, Borneo, U.S.A., Canada.

Pestalotia Hartigii Tubeuf, Beitr. Baumkr. p. 40, pl. 5 (as Pestalozzia). Sacc. Syll. x. 490. All. vii. 679, with fig. Died. 883. Mig. p. 593, pl. 87, f. 1–3. Lind, Dan. Fungi, p. 490, f. 35. See T.B.M.S. x. 109.

Pustules immersed, globose, on a thin flat basal stratum. Spores erumpent in black masses, at first hyaline, continuous, then 3-septate, ovoid-oblong, 18–20μ long; the two middle loculi large, minutely pluriguttulate, coloured, the terminal ones small, hyaline; apical bristles 1–4, thin, hyaline, $20 \times 1\mu$; sporophores filiform, slender, hyaline, 30–50μ long.

On bark of trunks of *Abies excelsa*, *A. pectinata*, and on seedlings of *Pinus*, *Cupressus*, and other conifers. Allied to *P. truncata*.

There is no trustworthy evidence that this has ever yet occurred in Britain. It is a true parasite. A variety is recorded on *Betula* by Laubert, with setae 30–40μ long, and by Hartig on *Fagus*. See Massee, Dis. Cult. Pl. 451, and Duggar, Fung. Dis. Pl. 338.

Germ. Denm.

Pestalotia tumefaciens Henn. in Verh. Bot. Ver. Prov. Brand. 1895, p. xxvi. Sacc. Syll. xiv. 1029. All. vii. 679. Died. p. 882, p. 870, f. 16. Mig. 594. (All as Pestalozzia.)

"Causing large tumours sometimes 4–5 cm. diam., but varying much in form and size. Spores very numerous, oblong-cylindrical, 3-septate, $13–17 \times 5–6\mu$; the two middle loculi equal, dark-brown; the lowest loculus hyaline, wart-shaped; the uppermost similar, but provided with three very slender, outwardly curved setae, which are about 25μ long; sporophores about 7–8μ long."

On branches of *Picea nobilis*, Sutton Hall, Sussex. *n.v.*

Tumours answering to the description occurred on the branches in Sussex, "but no fungus was found on them, nor was any developed under culture" (A. L. Smith).

It seems enormously more probable that the swellings were due to some cause not connected with the *Pestalotia*, and that the fungus which occurred on them in Germany was merely a form of *P. truncata*.

Germ.

Cyperaceae

Pestalotia caudata Sydow, in Bull. Herb. Boiss. 1900, II, i. 84. Sacc. Syll. xvi. 1017. Guba, in Mycologia, 1932, xxiv. 363.

Pustules small, arranged in series parallel to the nervures, about 160μ diam., covered, then erumpent, convex, greenish-black, then black. Spores erect, fusoid, tapering at both ends, 4-septate, about $28\times 6\mu$; the middle cells coloured, upper two fuscous, lower olivaceous, basal cell ± ovoid or tapering, upper cell long, conical or subcylindrical, bearing three (rarely two) acute, divergent, reflexed setae which are about 10μ long; sporophores rather thick, short.

On leaves and stems of *Cladium Mariscus*. Wheatfen Broad, Norfolk (E. A. Ellis). Mar.

Sydow's original find was on one of the Cyperaceae (undetermined) from Brazil. The Norfolk specimens agree with this in arrangement, in spore-shape, in the coloured cells, and in having usually three reflexed setae; but the agreement is not perfect.

South America.

Ericaceae

Pestalotia macrotricha Kleb. in Myc. Centralbl. 1914, iv. 6 (as Pestalozzia). Guba, Mon. I, p. 214, f. 2. *P. longiseta* Grove, in Journ. Bot. 1886, p. 198 (*non* Speg. 1879, on *Rubus*).

Spots brown. Pustules amphigenous, numerous, lens-shaped, subepidermal, then erumpent in a globule and finally covering the leaf with a broad black stain. Spores elliptic-fusoid, sometimes curved, 4-septate, $25–30\times 8–9\mu$; upper loculus cone-shaped, hyaline, bearing three long divergent hyaline bristles $35–45\times 1\mu$; the three middle loculi brown, the two upper being darker and sometimes quite opaque, the lower one pale yellowish-brown; lowest loculus cone-shaped, rather longer than the uppermost one, hyaline; sporophores hyaline, about $8\times 1\mu$. (Fig. 129 *b*, p. 346.)

On leaves of *Azalea*, Sutton Coldfield. On *Rhododendron*, Weybridge. Sept.

Two allied species have similar spores, but shorter setae: *P. Rhododendri* Guba, on *Rhododendron*, has setae $17–35\mu$, while *P. longiseta* Speg. on *Rubus*, has them $18–38\mu$.

Belg. Holl. Germ. U.S.A.

Euonymus

Pestalotia neglecta Thüm. Contr. Myc. Lusit. no. 343, in Inst. Rev. Sci. Coimbra, 1880, ser. 2, xxvii. 326 (as Pestalozzia). Sacc. Syll. iii. 788. Guba, *l.c.* II, p. 375, f. 2.

Pustules numerous, epiphyllous, conico-globose, raising the epidermis, then erumpent and surrounded by its laciniae, at

length free, 100–120μ diam. Spores narrow-fusoid, 20–25 $\times$ 6–7μ, 4-septate, slightly constricted; upper cell colourless, crowned by three setae; middle cells guttulate, pale olivaceous, all nearly the same colour; sporophores short; setae 10–20μ long.

On leaves of *Euonymus japonicus*. Polperro (Rilstone). June.

Ital. Port. U.S.A.

Ilex

Pestalotia annulata B. & C. in Grevill. 1874, ii. 155 (as Pestalozzia). Sacc. Syll. iii. 787. Guba, Mon. II, p. 361, f. 1. *Pestalozzia stellata* B. & C. N. Amer. Fungi, in Grevill. ii. 155. Trans. Woolhope Club, 1885, p. 364.

Spots circular or irregular, definite, pallid, surrounded by a very dark border. Pustules amphigenous, $\pm$ stellate or circinate, flat, punctiform, scattered, black, 140–280μ diam. Spores elliptic-fusoid, 4-septate, hardly constricted, 20–30μ long; the three median cells barrel-shaped, equally brown, guttulate, 12–15 $\times$ 7–8μ or the lowest of the three paler (olivaceous); end-cells conical, hyaline; apical setae three, divergent, 5–11μ long; sporophores short, attenuated downwards.

Recorded on dead leaves of *Ilex Aquifolium*, Sept. 1879, from Hermitage, Berkshire, by Rev. J. E. Vize (Trans. Wool. Club). *n.v.*

The original specimens of Berkeley and Curtis were on *Ilex opaca* from Alabama.

U.S.A.

Palmae

Pestalotia Palmarum Cooke, in Grevill. iv. 115 (1875); v. 102, pl. 86, f. 3 (as Pestalozzia). Sacc. Syll. iii. 796. Kleb. in Myc. Centralbl. iv. 9. Guba, Monogr. part I, p. 210, f. 4. *P. Phoenicis* Vize, in Grevill. v. 14 (1876). Gard. Chron. 1884, xxii. 429, f. 77–8.

Spots large, grey, roundish, with a very broad brown border. Pustules minute, scattered, black. Spores fusoid, 4-septate, straight or curved, 15–17 $\times$ 4–5μ; interior cells pale-brown; end-cells hyaline; apical bristles 2 or 3, about as long as the spore, often knobbed (?) at the end; sporophores short, 2–6μ.

On leaves of *Phoenix dactylifera* and *Corypha australis*.

Vize described his fungus as "bicristate", but on the original (Indian) specimen, from Col. Hobson, the spores often have three (or even four) setae. The disease is recorded on *Cocos*, *Kentia*, *Chamaerops* and other Palms (e.g. in France, in greenhouses). In Cooke's specimen there are no spots, but others show distinct spots as do those of Vize.

India, Philippines, West Indies, Java, Fiji, etc.

Quercus

Pestalotia montellica Sacc. & Vogl. in Atti Soc. Ven.-Trent, Sci. Nat. Padova, 1885, ix. 215 (as Pestalozzia); Syll. Fung. x. 489. Guba, Mon. II, p. 372, f. 2.

Pustules epiphyllous, punctiform (about 150μ diam.), black, lens-shaped, scattered or here and there clustered. Spores fusoid, usually straight, 4-septate, 20–24 × 6–7μ; the three median cells olivaceous, all of the same tint or nearly so, faintly guttulate, hardly constricted: end-cells conical, 2–3μ long; setae usually four, one longer, always at the very summit and erect, the others divergent or reflexed, 12–18μ long, and arising from below the apex of the terminal cell; pedicel short.

On leaves of *Quercus Ilex*. Ivy Hotel garden, Kew Green. July, 1917.

Guba describes the lateral setae as arising from the base of the apical cell; I did not find them so low down, but certainly below the apex. His specimens were on *Q. tinctoria*.

Ital. U.S.A.

[**Pestalozzia (Pestalozzina) Callunae** Cesati, in Rabenh. Fung. Eur. no. 61; Bot. Zeit. 1860, p. 174. Sacc. Syll. iii. 801.

On dead stem of Heather (*Calluna*). Kew. *n.v.*]

The specimens which I have seen under this name (non-British) had distinct carbonaceous pycnidia and did not belong to this genus.

DIPLOCERAS Sacc. Syll. x. 484 (as subgenus).

Pustules flat, minute, covered, not markedly erumpent. Spores oblong, with two or more transverse septa, the middle cells pale-olivaceous or yellowish, the end-cells hyaline, provided with two curved hyaline setae at each end; sporophores filiform.

The setae are not of the same nature as in Pestalotia, being of a softer substance.

Hypericum

Diploceras hypericinum Died. p. 887, p. 870, f. 17. Grove, in Journ. Bot. 1932, p. 6, pl. 599, f. 5. *Pestalozzia hypericina* Ces. in Klotzsch, Herb. Myc. II, 64. Bot. Zeit. 1855, p. 599. Sacc. Syll. iii. 795. *Hyaloceras hypericinum* Sacc. Syll. x. 485. All. vii. 707. Mig. 597.

Forming "brownish spots on the upper side of the leaves", but on the stems these are not or only faintly visible. Pustules scattered, minute, remaining covered, opening by a fissure. Spores cylindric-oblong, ± curved, sub-obtuse at both ends, 14–16 × 3–4μ, 3-septate (the end cells hyaline and smaller, the two median cells faintly olive), provided at each end with two (very rarely three) curved diverging deciduous setae 8–12μ long; sporophores filiform, about half as long as the spore, 1·5–2μ wide. (Fig. 130.)

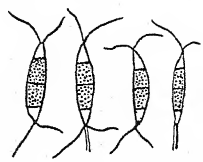

Fig. 130. *Diploceras hypericinum*; spores, ×600.

On dead stems of *Hypericum pulchrum*, near Garth Ferry, Anglesey (Rhodes). On dead stems of *H. perforatum*, near Ram's Wood, Haverfordwest, Pembr. (Rhodes). Jul. Aug.

The pustules are exceedingly inconspicuous. They were accompanied by *Metasphaeria ocellata* Sacc.

Germ.

AMPHICHAETA McAlpine, in Proc. Linn. Soc. N.S. Wales, 1904, p. 118. Sacc. Syll. xviii. 486.

Pustules and spores resembling those of Pestalotia, but the spores have a basal seta obliquely attached to the lowest loculus, with or without an apical seta attached to the uppermost loculus; pedicels somewhat deciduous.

Vitis

Amphichaeta europaea Grove, in Journ. Bot. 1917, p. 134. *Pestalozzia monochaetoidea*, var. *affinis*, Sacc. & Briard, in Rev. Mycol. 1886, p. 25. Sacc. Syll. x. 493. All. vii. 675.

Pustules gregarious, especially near the nodes, oval or oblong, blackish-brown, at first covered, then erumpent, up

to 500μ long, rather prominent, finally dropping out and leaving little pits. Spores ± ellipsoid, 3-septate, not constricted, $12–15 \times 4{\cdot}5–5\mu$, the two central cells olivaceous but pellucid; spores otherwise of three forms: (1) subfusoid, with the hyaline basal cell subconical and provided with an obliquely inserted seta; (2) subfusoid, with the apical cell also hyaline and provided with a centrally inserted but often oblique or flexuous seta; (3) obovoid, with the apical cell rounded, obtuse, without a seta and often coloured like the central cells, but frequently paler; pedicels hyaline, straight, deciduous, $10 \times 1{\cdot}5–2\mu$; setae varying in length, but mostly $8–10 \times 1\mu$.

On thick dead shoots of *Vitis vinifera*. King's Cliffe (Berkeley, Mar. 29, 1851).

Berkeley's specimens remained in the Kew Herbarium unnoticed and undescribed for over 65 years. They are localised in his own handwriting, and accompanied by one of his well-known little sketches, in which, however, the setae are not shown. The genus *Amphichaeta* has hitherto been known only from California (as "*Pestalozzia? anomala* Harkn."; see Sacc. Syll. iii. 800) and from Australia, where three species occur on leaves and stems; of these *A. Hakeae* Grove shows exactly the same variations in the form of the spores as does *A. europaea*.

Amphichaeta europaea, however, has apparently been met with in Europe before, but was ill-observed and consequently misdescribed by Briard (Rev. Mycol. *l.c.*) "sur les sarments morts et coupés du Vitis vinifera". It happens that the spores which have only the basal seta are most common and the pedicels are very deciduous; in order, therefore, to get the seta apical (as it should be in *Pestalotia monochaetoidea*) Briard seems to have turned the spores upside down in his mind and says that they are "arrondies généralement ou atteneuées quelquefois à la base, à loge supérieure conique et hyaline, celle de la base plus obtuse et de couleur plus foncée".

Fr.

STEGANOSPORIUM Corda, Ic. Fung. iii. 22.

Pustules under the periderm of branches, then erumpent, black, pulvinate, compact, forming a hard solid disc. Spores acrogenous, not concatenate, oblong, pyriform, or clavate, with two or more transverse septa and after a time some longitudinal ones, i.e. muriform, olivaceous or fuscous, often

with a characteristic smoky tinge; sporophores oblong or filiform, occasionally mixed with "paraphyses".

The spores of the chief species are pyriform in shape. The genus is as it were a Coryneum with muriform spores. The so-called "paraphyses" are merely pedicels which have lost their spore.

Plurivorous

Steganosporium pyriforme Corda, Icon. iii. 23, pl. 4, f. 61. Sacc. Syll. iii. 803; Fung. Ital. pl. 1108. All. vii. 712, with fig. on p. 709. Died. p. 888, p. 870, f. 20. Mig. 598. *Stilbospora pyriformis* Hoffm. Deutsch. Flor. part 2 (1795), pl. 13, f. 2. Fr. Syst. Myc. iii. 485. *Stilbospora ovata* Berk. Engl. Fl. v. 357; Cooke, Handb. 468.

Pustules subgregarious, long remaining covered, coriaceous, black. Spores varying from clavate to pyriform, rounded above, often truncate below, transversely 4–6-septate, with at length one or two longitudinal septa, not constricted, smoky-olivaceous, involved in mucus, each loculus with a thick wall as in Coryneum, $35–40 \times 15–18\mu$ ($25–30 \times 12$, Broome), finally oozing out to form a black hard-gelatinous mass or a strain around the pustule like a Melanconium; sporophores straight, filiform, $40–50 \times 2–3{\cdot}5\mu$. (Fig. 131.)

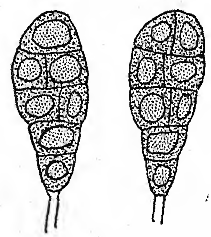

Fig. 131. *Steganosporium pyriforme*, on *Fagus*: spores, × 600.

On dead bark of various trees, e.g. *Acer Pseudoplatanus* and *Fagus*. Not uncommon. On *Fagus*: Batheaston and Wraxall (Broome); Bristol. On *Acer*: Ayrshire and Arran, etc. (Boyd); Hadzor Hall, Ws.; Dublin. Jan.–Jul.

The pycnidial stage of *Massaria Pupula* Tul. or a close ally. Europe, U.S.A.

Steganosporium cellulosum Corda, Ic. iii. 23, pl. 4, f. 62. Cooke, Handb. p. 647, f. 179. Currey, in Quart. Journ. Micro. Sci. 1856, iv. 197–9, pl. 11, with figs. Sacc. Syll. iii. 804. All. vii. 714, with fig. Died. p. 890, p. 870, f. 18. Mig. 599. *Sporodesmium cellulosum* Klotzsch, Herb. Myc. II, no. 189.

Pustules abundant, black. Spores subpyriform, with 5–7 transverse septa and a few longitudinal ones (mostly oblique), hardly at all constricted, smoky-brown, $30–60 \times 12–18\mu$ (32–

34μ long, Sacc.), involved in mucus and oozing out into a hard black mass; sporophores long, abundant, hyaline, about 4μ thick, somewhat branched.

On bark of *Tilia cordata*, Kew Gardens. On *Tilia europaea*: Swanscombe; Ringstead; Forden; Scarborough; Forres; etc. On *Fagus silvatica*: Weybridge; Penn, Staffordshire; Sparkhill, Worcestershire. On *Fagus*, Ireland (Lett). On a fallen leaf of *Tilia*, Renfrewshire (Boyd).

Recorded abroad also on *Acer* and *Aesculus*. It is, however, as Tulasne observed, quite certain that this species is the same as the preceding, differing only in age or in degree of development.

There is a very interesting experience to be related with regard to this. In the Sparkhill specimens, mentioned above, many of the pustules containing the spores of the *Steg. cellulosum* contained also, intimately mixed with them, colourless spores (50–80×4–6μ) which at first sight looked like those of a Cryptosporium. But further search showed that some few of them possessed one or even three septa. The first found were only the immature eseptate spores of *Fusarium expansum* Schlecht., i.e. the conidial stage of *Nectria Stilbosporae* Tul., which is known to grow parasitically on and in *Steg. pyriforme* as well as on its ascophorous stage *Massaria Pupula*. See this fully described in Tul. Carp. iii. 70–1, and beautifully illustrated in his plate 11, f. 15.

But it is also instructive, as showing one of the pitfalls of which the coelomycetologist must beware, to recall that Massee once described as "*Libertella ulcerata*" the spores of *Fusarium* (*Selenosporium*) *Urticearum* when growing in the pycnidia of *Phomopsis cinerascens* (see Vol. I, p. 187). This Fusarium, which is also called *F. lateritium* Nees, var. *Mori* Desm., was described by Tulasne (Carp. iii. 71–2) as the conidial stage of his *Nectria Selenosporii*, but is now rightly said by Wollenweber (Die Fusarien, 1935, p. 92) to belong to *Gibberella baccata* Sacc. var. *moricola*.

Europe, U.S.A.

Betula

Steganosporium muricatum Bon. Handb. Myk. p. 60, f. 52 (1851). Sacc. Syll. iii. 806. All. vii. 716. *Hendersonia polycystis* B. & Br. in Ann. Nat. Hist. 1850, v. 374. Cooke, Handb. pp. 436, 820. Sacc. Syll. iii. 441. All. vii. 196. *Steg. Fautreyi* Sacc. Syll. xiv. 1035. All. vii. 713, with fig. Died. p. 889, p. 870, f. 19. *Steg. irregulare* Fautr. in Rev. Mycol. 1895, p. 170, pl. 157, f. 5. *Steg. Betulae* Bres. *apud* Noelli, in Malpigh. 1903, xvii. 417, f. 6. Mig. 599.

Pustules immersed, $\pm$ globose, densely covered beneath the epidermis with cinereous flocci, plurilocular. Spores broadly oblong-ellipsoid, multilocular, with transverse (3–5–7) and longitudinal (2–4) septa, dark smoke-coloured, in-

volved in mucus, 42–60 × 20–24μ; sporophores septate, ± hyaline below, 30–50 (or more) × 4–5μ; spores oozing out in a black mass. (Fig. 132.)

On dead twigs of *Betula.* Batheaston; Spye Park, Wilts.; Coombe Wood; Elmhurst; etc. (B. & Br.). Mar. Apr.

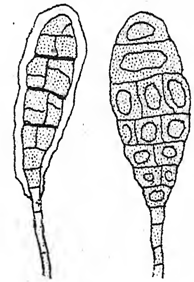

Fig. 132. "*Hendersonia polycystis*": spores, from one of Berkeley's specimens on *Betula*, × 600.

The pycnidial stage of *Massaria Niessleana* Rehm = *M. Argus* Fres.

It is probable that the two following species are also synonymous with *Steganosporium muricatum*: *Myxocyclus polycystis* Sacc. in Ann. Mycol. 1908, vi. 559 (Syll. xxii. 1084), and *Myxocyclus confluens* Riess, *apud* Fresen. Beitr. i. 63, pl. 7, f. 41–5 (1852). But it may be that the allied continental forms on *Alnus* are not quite identical with ours on *Betula*.

Europe, Siberia.

No species of the genus Phragmotrichum seems so far to have been met with in the British Isles, although it is likely to occur.

ADDENDA TO VOL. I

There are three very common leaf-fungi which may present a puzzle to beginners, because, although they are never pycnidial, they seem to be so, being much more abundant in an immature and sporeless than in the perfectly developed ascosporous state. They are:

Phyllachora Angelicae Fckl. (on *Angelica*), see Vol. I, p. 5;
,, *Heraclei* Fckl. (on *Heracleum*);
,, *Podagrariae* Karst (on *Aegopodium*).

They all three form black crusts, interrupted here and there, on the lower surface of the leaves; this crust is composed of numerous minute black crowded conceptacles reminding one of a Phyllosticta or a Septoria. In them there are usually no finished spores, only growth-cells such as have often been mistakenly called "spores" (e.g. in *Phoma deusta*). But in favourable circumstances asci and ascospores are developed. In the immature state they have often been recklessly labelled Septoria or Phyllosticta.

A similar, but less crowded, instance is afforded by what Cooke (Handb. p. 448) called "*Septoria Sorbi* Lasch", on *Sorbus Aucuparia*, in which usually no true spores can be found. This also is an immature state of an ascomycete, see Vol. I, pp. 43–4.

Pyrus

Cytosporella fructorum[1] Marchal, in Bull. Soc. Roy. Bot. Belg. 1921, liv. 125.

A form which was provisionally assigned to this species occurred in Cambridgeshire; see Southee & Brooks, in T.B.M.S. 1926, xi. 213–19, with figs. The Belgian specimen was on fruits of *Pyrus*. The English specimen (*n.v.*) supposed to be the same fungus, was on branches of Apple, with subglobose spores 9–14 × 7–10 μ, each with a large guttule like a Coniothyrium; this has been said to be only *Phacidiella discolor* Petr. (*Phacidium discolor* Mont. & Sacc.), but that is doubtful. See Vol. I, p. 343. Cytosporella is a very unnatural genus.

Medicago

Ascochyta suspecta Peck, Rep. of State Botanist, 1911, p. 21. *Phoma Medicaginis* Malb. & Roum. Fung. Gall. exs. no. 3675. *Phoma herbarum* Westd. f. *Medicaginis* Fckl. Symb. Myc. 134. *Ascochyta Medicaginis* Fckl. Symb. Myc. 388. *Phyllosticta Medicaginis* Sacc. Syll. iii. 42. *Ascochyta Pisi* Lib. var. *Medicaginis* Sacc. *Diplodina Medicaginis* Oud. See Sacc. Syll. xviii. 351.

This is reported on *Medicago sativa*, *M. lupulina*, from Cambridge, Suffolk, Norfolk, Bedfordshire, etc. See Ann. Appl. Biol. 1936, xxiii.

[1] The classical genitive plural of *fructus*, a fruit, is *fructuum*.

705ff. It was included in Vol I, p. 29, under Phyllosticta, but (as happens with many of the oval-spored species placed in that genus) is undoubtedly an Ascochyta (see Vol. I, p. 309). Probably it is not quite identical with *A. Pisi* Lib., having on the average much smaller spores and being less frequently 1-septate.

Gramineae

Ascochyta graminicola Sacc. (See Vol. I, p. 323.)

Fragoso, in 1914, recorded from Spain two varieties of this species:

Var. **coeruleae** Bri. & Har. in Rev. Mycol. 1891, p. 17 (see Sacc. Syll. x. 308), on *Arrhenatherum elatius*.

Var. **ciliolata** Sacc. Syll. iii. 407, on *Corynephorus canescens* and *Festuca*, etc.

The spores of both these varieties were penicillate at the ends, and should undoubtedly be referred to Tiarospora or Darluca.

Rhododendron

Diplodina Eurhododendri Voss, Mat. Pilzfll. Kains, v, p. 229, f. 9. All. vi. 693. Mig. 302. Sacc. Syll. x. 312.

Spots occasionally round, but irregular when beginning (as often) at the tip of the leaf or on the edge, cinereo-fuscous, surrounded by a rather broad purplish-brown border, often occupying a large part of a leaf. Pycnidia numerous, epiphyllous, immersed, but soon erumpent, subglobose, black, shining, 200–250μ diam.; wall of dense rather dark parenchyma. Spores fusoid or ellipsoid, for a long time continuous, biguttulate, at length 1-septate, not constricted, mostly $9–13 \times 2–3\,\mu$, but when full-grown $14–18 \times 4\,\mu$.

On living leaves of *Eurhododendron*, cult. Berry Hall, Solihull (Chesters). Callestick, Cornwall (Rilstone). June.

A pycnidial stage of *Cenangella Rhododendri* Rehm. Cf. Nannfeldt, Studien, 307.

Germ.

Anemone

Septoria Anemones Desm. (See Vol. I, p. 368.)

Var. **coronariae**, var. nov. *maculis magnis, atro-brunneis vel ferme nigris, eximie definitis.*

Spots dark-brown or almost black, large, well defined, mostly marginal, irregular in form, but not bordered with another colour.

On leaves of *Anemone coronaria*, Penzance (Gregory). Oct.

Sambucus

Septoria Ebuli Desm. & Rob. in Ann. Sci. Nat. 1850, p. 22. Sacc. Syll. iii. 543.

Spots visible on both sides, round, dingy-grey, with an indistinct border. Pycnidia epiphyllous, punctiform, often collected into groups, black, slightly protruding. Spores filiform, usually straight, faintly guttulate, hyaline, 30–36 × 1 μ.

On leaves of *Sambucus Ebulus*. Ingham, Norfolk (E. A. Ellis). Sept.

Germ.

Buddleia

Rhabdospora Buddleiae, sp. nov.

Pycnidia scattered or aggregated, immersed, then erumpent, lens-shaped, flattened, black, up to 200 μ diam., texture somewhat thicker than of *Coniothyrium Buddleiae*. Spores linear, acuminate at both ends, straight or flexuous, faintly yellowish, indistinctly microguttulate, 14–20 × 1–1·5 μ.

On dry dead branches of *Buddleia variabilis*, in the garden of the School House, Polperro. Apr.

It was accompanied by *Coniothyrium Buddleiae*, *q.v. supra*, p. 4.

Ulex

Rhabdospora Ulicis, sp. nov.

No spots. Pycnidia thick, opaque, coriaceous, black, immersed, then emerging and somewhat protruding through a short fissure. Spores linear, straight, rounded at the ends, colourless, 20–27 × 2–3 μ, at first guttulate, at length with three or more rarely four septa.

On the spiny leaves of *Ulex Gallii*. Hartlebury Common, Worcs. (Rhodes). May.

The truth of the septation was evident in the usual way, viz. by the fact that an end-cell could frequently be seen to be empty of protoplasm while the others were filled and turgid. This species is allied to *R. Vincae* Died. It also resembles in its spores *Septoria Spartii* Rob. & Desm., but differs in causing no spots and in having a much thicker peridium.

Prunus

Micropera spuria v. Höhn. Fragm. z. Mykol. no. 950, p. 36. *Sphaeronaema spurium* Sacc. Syll. iii. 186.

On dead branches of a tree of *Prunus domestica* growing wild in the famous Dingle at Bewdley, Ws., I found an abundance of this species. It has already been recorded in Vol. I, p. 160 under Saccardo's name, but examination showed that it is really a Sphaeronaema, closely allied to *M. Drupacearum*. The two species, on Plum and Cherry respectively, are in fact as similar as the corresponding ascomycetous stages *Dermatea* (*Cenangium*) *Prunastri* Fr. and *D. Cerasi* Fr., but in both stages the spores on the Plum seem to be shorter than on the Cherry. In the Bewdley specimen, from which the Fig. 133 is drawn, the spores were lunate-fusoid and guttulate, without any signs of septation; they measured $18–24 \times 3–4\,\mu$. There were no ascophores of Dermatea to be found on the tree. The records on cultivated Plum in Vol. I, p. 448, belong to *M. spuria*. Note also that the records of *Sphaeronaema versiforme* (Vol. I, p. 161) should be credited to a Micropera (*Micropera versiformis* Grove).

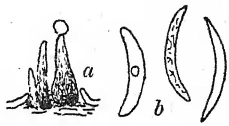

Fig. 133. *Micropera spuria*: *a*, group of pycnidia, $\times 12$; *b*, spores, $\times 600$.

DIAGNOSES GENERUM ET SPECIERUM NOVARUM IN HOC VOLUMINE EDITARUM

Rhabdospora Buddleiae Grove. Pycnidia sparsa v. aggregata, immersa, dein erumpentia, lenticularia, applanata, atra, usque ad $200\,\mu$ diam., contextu aliquantulum crassiore quam in *Coniothyrium Buddleiae*, quacum consociatur. Sporulae lineares, utrinque acuminatae, rectae v. flexuosae, flavidae, indistincte microguttulatae, $14–20 \times 1–1{\cdot}5\,\mu$.

Hab. in ramulis siccis emortuis *Buddleiae variabilis*, apud School House, Polperro. (Page 360.)

Rhabdospora Ulicis Grove. Maculae nullae. Pycnidia crassa, opaca, coriacea, atra, $100–180\,\mu$ diam., immersa, dein emergentia et prominula, epidermidem rima brevi rumpentia. Sporulae lineari-cylindricae, rectae, utrinque rotundatae, achroae, $20–27 \times 2–3\,\mu$, guttulatae, dein septis tribus (rarius quatuor) partitae.

Hab. in foliis (spinis) *Ulicis Gallii*, Hartlebury Common, Worcestershire. (Page 360.)

Microdiplodia Nissoliae Grove. Pycnidia pauca, sparsa, immersa, depresso-globosa, dein vertice per porum laceratum protruso, nigra, nitentia, ca. $200\,\mu$ diam. Sporulae lineari-oblongae, utrinque obtusae, 1-septatae, haud constrictae, curvulae, atro-brunneae, biguttulatae, $8–10 \times 2{\cdot}5–3\,\mu$ ($11 \times 4\,\mu$, Rhodes).

Hab. in stipitibus emortuis *Lathyri Nissoliae*. (Page 27.)

Microdiplodia Magnoliae Grove. Pycnidia iis *Diplodiae Magnoliae* similia, at minora (100–180 μ) atque paullo densiuscule congregata. Sporulae item forma et colore similes, 10–11 × 4–5 μ tantum attingentes.
Hab. in foliis emortuis *Magnoliae grandiflorae* (sed foliis emaculatis). (Page 28.)

Microdiplodia Obiones Grove. Pycnidia sparsa, rotunda, tenuiora, atra, immersa, ca. 200 μ diam., per epidermidem conspicua atque tandem eam rumpentia. Sporulae atro-brunneae, primo difformes vel irregulariter globosae, 10 μ diam., postea ovoideae aut ovales, 1-septatae, loculis subinaequalibus, 12–16 × 8–10 μ, sporophoris nullis visis.
Hab. in stipitibus emortuis *Obiones portulacoidis*. (Page 28.)

Camarosporium Ficus Grove. Pycnidia sparsa, raro subgregaria, subglobosa, nigra, immersa, dein vertice pertuso erumpentia, 200–250 μ diam. Sporulae oblongae, utrinque valde obtusatae, continuae, dein 1-septatae, tandem 3-septatae, brunneae, leviter fuligineae at non opacae, raro constrictae, 12–20 × 5·5–6 μ: posterius uno e loculis mediis longitudinaliter diviso; sporophoris nullis visis.
Hab. in ramis *Ficus Caricae*. (Page 96.)

Camarosporium Magnoliae Grove. Pycnidia numerosa, densiuscule sparsa, usque ad 400 μ lata, erumpentia, convexa, atra. Sporulae oblongae, 1–4-septatae, septo longitudinali subinde praeditae, atro-brunneae, haud constrictae, 10–16 × 4–6 μ.
Hab. in foliis *Magnoliae grandiflorae*, pycnidiis praecipue secundum nervos medianos digestis. (Page 98.)

Camarosporium Rosae Grove. Pycnidia dense sparsa, globosa, papillata, parva (ca. 120 μ diam.), atra, velata, dein papillâ per rimam laceratam protrusâ. Sporulae oblongae, utrinque obtuse rotundatae, 3-septatae (rarissime 4–5-septatae), septis longitudinalibus uno aut duobus praeditae, aequaliter atro-brunneae, vix constrictae, 16–20 × 5·5–6 μ, sporophoris nullis visis.
Hab. in ramis vetustis *Rosae damascenae*. (Page 102.)

Cytosporium Melanomma Grove. Pycnidia gregaria, ligno adnata et basi insculpta, ovoidea, usque ad 500 μ lata, carbonacea, fragilia, glabra, atra, opaca, irregulariter dehiscentia. Sporulae ellipsoideae, utrinque rotundatae, 3-septatae atque tandem muriformes, olivaceo-brunneae, dein fuligineae, 15–16 × 8–9 μ.
Hab. in ramis emortuis decorticatis *Fraxini excelsioris*. (Page 112.)

Sphaeronaemella glomerata Grove. Pycnidia solitaria aut in glomerulos parvos (3–6 in unoquoque) stipata, superficialia, mollia, ovoidea, rostro obpyriformi praedita, 200–300; diam., rosea, dein roseo-brunnea, basi hyphis copiosis roseis intertextis cincta; rostri ostiolo fimbriato. Sporulae copiosae, ovales, utrinque obtusae, saepe curvulae, biguttulatae, ferme achroae, 3–5 × 1·5 μ.
Hab. in strato gelatinoso, in Petripatellâ conservato. (Page 116.)

SCLEROZYTHIA gen. nov. Petch.

Pycnidia superficialia, laete colorata, primo astoma, solida, parenchymatica. Sporulae hyalinae, continuae, sessiles.

Sclerozythia Brassicae Petch, *in litt.* Pycnidia sparsa vel gregaria, ovoidea vel subglobosa, usque ad 250 μ diam., atro-brunnea, dein rubra, glabra, peridio crasso parenchymatico instructa, primo clausa, dein poro dehiscentia. Sporulae oblongo-ovales, continuae, hyalinae, 15–20 × 7–11 μ, seriatim digestae at non concatenatae.

Hab. in stipite putrescente *Brassicae*. (Page 118.)

Fusidomus Pruni Grove. Pycnidia solitaria aut in glomerulos parvos congesta, per peridermium erumpentia ac tandem superficialia, subglobosa aut excipuliformia, nigra, 200–300 μ diam., vertice poro rotundo minimo pertusa, contextu molli, semipellucido, coeruleo-purpureo conflata. Sporulae oblongo-fusoideae, 3-septatae, constrictae, utrinque rotundatae, fere hyalinae, 27–30 × 9–10 μ, e mycelio ramoso hic illic noduloso oriundae.

Hab. in ramulis emortuis *Pruni Laurocerasi*. (Page 123.)

Leptothyrium Anemones Grove. Pycnidia amphigena, cuticulâ tantum velata, in series lineatas digesta, dimidiata, rotunda, ca. 200 μ diam., magnopere convexa et proëminentia, olivaceo-brunnea, nitentia, rugosa, poro centrali pertusa, contextu ex hyphis sinuosis pallide olivaceis e centro radiantibus conflato, margine leviter fimbriato. Sporulae ovales, ovoideae, vel subrotundae, 2–3 μ diam., sporophoris stipatis, erectis, linearibus, 20 × 2·5 μ vel brevioribus suffultae.

Hab. in foliis vivis *Anemones coronariae*. (Page 169.)

Labrella ligni Grove. Pycnidia sparsa, raro subconfluentia, scutiformia, oblonga, ovalia, vel lanceolata, usque ad 600 μ longa, castaneo-nigra, subnitida, demum rugosa, umbonata aut longitudinaliter sulcata. Sporulae copiosae, fusoideo-lunulatae, 10–12 × 1–1·5 μ.

Hab. in superficie trunci cujusdam decorticati. (Page 185.)

APOMELASMIA gen. nov.

Pycnidia iis *Melasmiae* subsimilia, at non rimis longis, sed poro irregulari vel rotundo dehiscentia.

Genus *Phomopsidi* potius quam *Melasmiae* affine. (Page 188.)

Leptostromella graminis Grove. Pycnidia anguste lanceolata vel linearia, usque ad 750 μ longa, plus minus seriata, innata, nitida, atra, non facile secedentia. Sporulae copiosae, filiformes, rectae aut saepius curvulae, etiam arcuatae, minute guttulatae, vix apice attenuatae, 12–18 × 0·5–0·75 μ, fere hyalinae, e cellulis ovoideis strati proliferi oriundae.

Hab. in foliis languescentibus *Graminearum*. (Page 194.)

Pycnothyrium Junci Grove. Pycnidia sparsa vel in series curtas digesta, scutiformia, inversa, plana, rotunda, 200–300 μ diam., atra, opaca, astoma, contextu e cellulis prosenchymaticis radiantibus linearibus atro-olivaceis at non opacis conflato, margine undulato sed non fimbriato, facile secedentia nec matricem foedantia. Sporulae lineares, utrinque obtusatae, ferme rectae, microguttulatae, hyalinae, 6–8 × 1–1·5 μ, sporophoris nullis visis.

Hab. in culmis emortuis *Junci communis*. (Page 197.)

RHODESIA gen. nov.

Acervuli minutissimi, immersi, dein poro lato emergentes. Sporulae laete-colores, continuae, late ovales vel fusoideae, e sporophoris curtis simplicibus fasciculatis apice oriundae. (Page 205.)

Myxosporium Aucubae Grove. Acervuli aggregati, proëminentes, 300–400 μ diam., epidermidem convexe levantes, atri. Sporulae oblongae, utrinque rotundatae, continuae, achroae, eguttulatae at intus minute granulosae, 18–28 × 8–9 μ, sporophoris oblongo-linearibus, sporulas ferme aequantibus, sed dimidio angustioribus suffultae.

Hab. in ramulis *Aucubae japonicae*. (Page 248.)

Myxosporium typhinae Grove. Acervuli sparsi, convexi, velati, dein epidermidem stellate rumpentes, extus atri, intus albi. Sporulae oblongo-obovoideae, apice rotundatae, intus oleoso-granulosae, 22–25 × 8–9 μ.

Hab. in ramis *Rhois typhinae*. (Page 255.)

Pestalozzina uniseptata Grove. Acervuli immersi, depresso-globosi, 200–300 μ diam., sparsi vel subaggregati, atri, per epidermidem conspicui eamque tandem rumpentes. Sporulae copiosae, fusoideae, hyalinae, guttulis minimis nubilosae, achroae, utrinque in appendiculam curvulam (septo non praeditam) attenuatae, 57–72 × 5–7 μ, sporophoris brevissimis suffultae.

Hab. in fragmento vetusto folii cujusdam monocotyledonei, maris fluctibus in litus rejecto. (Page 287.)

Cryptosporium Malvae Grove. Acervuli atri, 120–300 μ diam., poro lato emergentes. Sporulae cylindricae, arcuatae vel fere rectae, hyalinae, eseptatae, apicibus plerumque rotundatae, 16–20 × 2–3 μ, sporophoris erectis linearibus rectis sporam subaequantibus suffultae.

Hab. in stipitibus emortuis *Malvae silvestris*. (Page 301.)

Libertella quercina Grove. Acervuli parvi, plani vel subconici, tri- vel quadriangulati, atri, hymenio prolifero labyrinthiformiter reticulato, pallide cinereo, tandem sporis aureo-flavis oblito. Sporulae copiosae, graciles, valde arcuatae, 35 μ v. amplius longae, in cirros aureos expulsae.

Hab. in cortice *Quercus*. (Page 306.)

EPILOGUE

To a friend
who has that rare gift,
IMAGINATION,
and to whom therefore I can speak out my mind
with perfect freedom.

In nearing the end of this long catalogue of the British Coelomycetes, it is with a feeling of profound diffidence that I am going to lay down my pen; for the list is full of gaps or perhaps discrepancies; there is so little known and so much remaining to be done.

My aim has been to set before the English-speaking reader, for the first time in his own language and so far as it is illustrated by the British species of this group, a panoramic view of the skilful structure erected by the inimitable genius of Saccardo,[1] some fifty years ago, to include them all in one scheme.

This scheme, which replaced the chaos reigning up till that time, is distinguished by its simplicity and its beauty. All forms of the spores can be embraced by it and they are indeed remarkable for their variety and charm. For instance, what could be more unexpected, more surprising, more redolent of *chinoiserie*, than the apparition among them of the neat little geometrical formula upon which the wonderful *Asterosporium Hoffmanni* constructs its spores?[2]

There is one (and, I think, only one) suggested improvement that should be made in Saccardo's scheme, and that is by the fusion of certain subdivisions. Just as I have shown in the descriptions in this book that there is no firm distinction between Sphaeropsidales and Melanconiales, so there is none between Ascochyta and Diplodina or between Rhabdospora and Septoria, and so on. Nevertheless the retention of these separations for a time might be justified on the ground of

[1] P. A. Saccardo, Professor of Botany at the University of Padua, in his *Sylloge Fungorum omnium hucusque cognitorum*, vol. iii (1884).

[2] See this Volume, p. 341.

convenience. But there is one sometimes suggested alteration that I think should be resisted in any case, viz. the fusion of Phyllosticta and Phoma. There are very many Phyllostictas which are truly phyllostictoid and very many Phomas which are truly phomoid. The intermediate kind, those that sit upon the fence, are comparatively few, and the inconvenience caused to the indolent investigator by his having to look in two places in the book if he finds one of these few will be more than counterbalanced by the thrill of relief he will feel when one of the many typical Phomas or an unmistakable Phyllosticta[1] "swims into his ken".

Pity it is that such an elaborate edifice should be doomed ultimately to demolition. For, evidently, if ever the aim of mycologists who have studied this subject is realised, and in some distant future age every Coelomycete is referred to its appropriate Ascomycete into whose life-history it becomes absorbed, the necessity for the scheme will have vanished. But even then we may still fondly hope that some of the beloved names—Phyllosticta, Phoma, Diplodia, Melanconium—will linger long in the literature, just as the word Zoëa[2] continues even to-day to adorn the pages of zoological text-books which treat of the development of the crab.

I have been accused of violating the International Rules of Botanical Nomenclature. The charge is true, and will be true again; the reason lies in the inhuman rigidity of the Rules. There can be no human regulations but must permit of exceptions:

"*Neque semper arcum*
Tendit Apollo."

[1] E.g. narrow-oblong-spored *Phyllosticta hedericola*. The more-oval-spored Phyllostictas are, of course, mostly nothing but young imperfectly developed states of the corresponding Ascochytas, to which they should be attached, e.g. *Phyllosticta Violae*=*Ascochyta Violae*: to absorb such species into Phoma would be the acme of absurdity.

[2] The word "Zoëa" (three syllables) was originally a generic title, invented when the organism so called was not yet known to be merely an early stage in the life-history of a Decapod.

It may be a little help to younger students to mention here that throughout these two volumes the digraphs "ae" and "oe" (both pronounced as "*ee*" in *seed*) are printed always so and never with joined letters as in most English books. When the two letters are to be pronounced separately, the diaeresis is used, as in Hippophaë and Elsinoë (four syllables).

Besides that, in any case, questions of taste, grammar, and etymology lie, and will always lie, beyond the ambit of a Botanical Conference. It would take more than a Committee of Mycologists to reconcile me to a world in which such an atrocious etymological abortion as Massee's *Pyrenochaeta* **Phloxidis**[1] was fostered with loving care.

I have also been charged with ruffling the dignity of some Phytopathologists by accusing them of ineffectiveness. The charge is true and the accusation likewise. For there are many articles treating of the relations of the Coelomycetes to the Ascomycetes, which seem to me to be pointless and which clutter-up the pages of certain British and foreign mycological Journals. Forsooth, one might almost be forgiven for being inclined to surmise that the fault may have lain occasionally with the uninspired higher directing powers to whom the students had to look for light and leading:

> "*Alas, unconscious of their doom,*
> *The little victims play.*"

Some have plunged into the thorny thickets of synonymy, floundering amid the multitudinous meticulosities of Nomenclatorialism,[2] from which they rarely emerge unscathed; others wandered disconsolate over arid deserts of Petripatellism,[3] plodding dully along a path, meandering and redeless, which could of necessity lead nowhither; still others filled up their space with frills, such as a boring discussion

[1] See Vol. I, p. 152.

[2] Nomenclatorialism. An intricate esoteric art which strives to affix to every living creature (plant or animal) a definite unchangeable Latin label in strict accordance with the very latest views about Scientific Nomenclature. The object of the art was to reach finality; but it has not attained that end, nor can it, so long as the multiplicity of nature is rivalled by the variety of men's minds. A naturalist should take heed lest he become too nomenclatorialistically minded.

[3] Petripatellism. The state of mind of a mycologist who studies his fungus in a laboratory, on agar-slants or *Petri-dishes,* without paying equal regard to what the fungus can do out of doors in the wide and untrammelled field.

For instance, an ordinary Libertella, on its host, is always when full-grown devoid of the slightest trace of a peridium; but we have learnt that the same fungus in the laboratory, on agar, can form a really ostiolate pycnidial wall around its proliferous layer.

Actinonema Rosae can illustrate a similar power on its own host, and so can many others, as I have pointed out in the text.

of the dietetical predilections of the patient for concocted foods; only a few, following in the footsteps of the famous Klebahn, like Stoneman and others in the United States, and Dr Mary J. F. Gregor at Edinburgh,[1] have had the happy knack at times to drive straight and direct to their proposed end, and neatly and efficiently achieve their goal.

I myself was born too soon (1848) to have an early training in the art of pure cultures, which had not then been yet invented. But I yield to no one in admiration for this gentle art, and the skill and patience which it implies. It is capable of leading to most important results, when wisely used. If every phytopath of to-day would but *prove* something, how jubilant we should be! But no! In this matter we are left to mourn, and we mutter to ourselves (with Browning)—

"*The little less and what worlds away!*"

But we must not forget that there is a queer idea advocated by a certain sect of transatlantic biologists, including some mycologists, and appearing to have gained a foothold in this country, that what is required of them is merely a grovelling collection of bare facts. This is a fatal error. Though essential as a groundwork for reasoning, facts in themselves are dead and of little value; it is the disciplined play of thought and imagination—in one word, philosophy—upon the facts which really illumines them and gives them life and meaning. The recent advances in physical science form a vivid illustration of this truth.

Many of our plant pathologists have left the natural mode of work that was universal in earlier times, work out in the open.

"*Oh! for the touch of a vanished hand!*"

The old weather-beaten field-naturalists (despite their want of platinum needles) were in many respects nearer to nature, and to the truth, than a great many of their pallid indoor successors of to-day.

What is now chiefly required in the department of mycology here considered is more work with the fungus as it occurs on

[1] See this Volume, p. 221.

its host and in its natural environment. Especially does it require to be decided in how many instances the same Coelomycete can flourish in the field on several unrelated plants. Some authorities assert, without convincing proof, of a species of Diplodia, that it can grow upon nearly a hundred different hosts belonging to diverse genera; others, also without sufficient proof, consider that a Coelomycete, say a Pestalotia,[1] on each different kind of host usually deserves to be regarded as a distinct species. This sort of uncertainty is detrimental to the science, but it can be removed only by intensive efforts of team-work continued on the same genus for several (at least three or four) years in succession, unhampered by commercial or financial considerations.

Whatever is done, ONE THING REMAINS FIRM. Rotating on a laboratory-stool is not the only way, perhaps not even the best way, of solving coelomycetous secrets.

[1] See this Volume, pp. 345–52.

PHOMOPSIS PERNICIOSA,
an adventurous Coelomycete[1]

A spore lay, new-born, on a leaf.
  Said he to himself, said he:
"I'm as full of pep as a pirate bold,
  As a pirate bold should be."

Within the pear-leaf's mesophyll
  His birthplace was concealed.
A myriad others like himself
  That secret cave can yield.

"'A myriad others?'—Yes, 'tis true;
  But 'like myself'—Oh, nay!
Nay, nay, Sir William, for I'm made
  Of sterner stuff than they.

"For me, I feel, the tide of life
  In novel course will roll.
Like Henley, I will master fate,
  Be captain of my soul.

"Adventures to th' adventurous!
  I've planned a selfish joy
(From some small change of genes in me)
  These orchards to destroy.

"*Perniciosa* will I be,
  And write my fateful name,
Like Captain Cook and Captain Kidd,
  On the long bright scroll of fame."

W. B. G.

[1] About sixteen years ago, or earlier, a disease of fruit-trees appeared in orchards in Belgium, England, the United States, etc. It caused great damage; the cause was said to be a fungus to which the name *Phomopsis perniciosa* was given. But it is reasonable to believe that this fungus was only a mutation of some previously existing, but less noticeable parasite—see Vol. I, p. 214; and cf. *Diplodia Griffoni*, in the present volume, p. 54, for a similar instance.

INDEX OF ASCOMYCETES

A list of Ascomycetes that have been assigned by various authors to Coelomycetes contained in these two volumes—some, perhaps, with little reason; the majority because of close association; a few, from actual proof. For details see the pages cited.

SECTION I. ASCOMYCETES THAT HAVE A PYRENOMYCETOUS AFFINITY

SECTION II. ASCOMYCETES THAT HAVE A DISCOMYCETOUS AFFINITY

INDEX OF HOSTS

Index of British Hosts on which Coelomycetes in Volume II are recorded.

INDEX OF BINOMIAL NAMES[1]

When more than one page is cited, the black figures denote that on which the description is given.

[1] This Index has been compiled almost entirely by my esteemed friend, Mr C. G. C. Chesters, M.Sc., to whom I owe my very best acknowledgments for this help and for valuable assistance in correcting the proofs of Volume II.

ADDITIONAL NOTE ON DIPLODIA

During my prolonged illness, Neil Stevens published (in Mycologia, 1936, pp. 330–6) an important paper on the species of Diplodia. Here he reasserted his statement about *Sphaeropsis malorum* Berk. to which reference was made in this volume, p. 54, that it is identical with *D. mutila* Fr. & Mont. which lives on *Populus*; but he also asserts that it has occurred in England on *Crataegus* and *Fraxinus* in its ascophorous stage which he names *Physalospora mutila* Stevens.

Furthermore, he states that *D. sarmentorum* Fr. is identical with *D. vulgaris* Lév., *D. salicina* Lév., *D. Crataegi* Westd., *D. Rosae* Westd., *D. inquinans* Westd., *D. Euonymi* Westd., and several other species. But his statements seem to be still unsupported by any outdoor culture work, and so have little convincing power.

LIST OF THE MOST IMPORTANT OF AUTHORITIES' NAMES WHICH ARE USUALLY ABBREVIATED IN CITATIONS

Allescher, A.	(All.)
Auerswald	(Auersw.)
Bary, A. de	(de By)
Berkeley, M. J.	(Berk. or B.)
Berlese, A. N.	(Berl.)
Bonorden, H. F.	(Bon.)
Bresadola, G.	(Bres.)
Broome, C. E.	(Br.)
Brunaud, P.	(Brun.)
Bubák, F.	(Bub.)
Candolle, A. P. de	(DC.)
Cavara, F.	(Cav.)
Cesati, V. de	(Ces.)
Cooke, M. C. & Massee, G.	(C. & M.)
Corda, A. C. J.	(Cord.)
Currey, F.	(Curr.)
Curtis, M. A.	(Curt. or C.)
Delacroix, G.	(Del.)
Desmazières, J. B. H. J.	(Desm.)
Diedicke, H.	(Died.)
Edgerton, C. W.	(Edg.)
Ehrenberg, C. G.	(Ehren.)
Ellis, J. B.	(Ell.)
Everhart, B. M.	(Ev.)
Fautrey, F.	(Fautr.)
Fries, E. M.	(Fr.)
Fuckel, L.	(Fckl.)
Greville, R. K.	(Grev.)
Hedwig, R. A.	(Hedw.)
Henning, E.	(Henn.)
Höhnel, F. von	(v. Höhn.)
Kabát, J. E.	(Kab.)
Karsten, P. A.	(Karst.)
Klebahn, H.	(Kleb.)
Kunze, G.	(Kunz. or K.)
Lambotte, F.	(Lamb.)
Léveillé, J. H.	(Lév.)
Libert, Marie A.	(Lib.)
Magnus, P.	(Magn.)
Massalongo, C.	(Massal.)
Maublanc, A.	(Maubl.)
Migula, W.	(Mig.)
Montagne, J. F. C.	(Mont.)
Mougeot, J. A.	(Moug.)
Notaris, G. de	(Not.)
Oudemans, C. A. J. A.	(Oud.)
Passerini, G.	(Pass.)
Penzig, O.	(Penz.)
Persoon, C. H.	(Pers.)
Petrak, F.	(Petr.)
Prillieux, E. E.	(Prill.)
Rabenhorst, G. L.	(Raben.)
Rostrup, F. G. E.	(Rost.)
Roumeguère, C.	(Roum.)
Saccardo, P. A.	(Sacc.)
Schroeter, J.	(Schroet. or Schröt.)
Schweinitz, L. D. von	(Schwein.)
Sowerby, J.	(Sow.)
Spegazzini, C.	(Speg.)
Stoneman, Bertha	(Stonem.)
Sydow, H.	(Syd.)
Thümen, F. K. A. von	(Thüm.)
Traverso, J. B.	(Trav.)
Tulasne, L. R. & C.	(Tul.)
Vuillemin, P.	(Vuill.)
Wallroth, C. F. W.	(Wall.)
Westendorp, G. D.	(Westd.)
Winter, G.	(Wint.)

FINIS

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